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MARCH 1986
VOLUME 4
ISSUE 3

Apple II/Macintosh

THE INDEPENDENT GUIDE TO APPLE COMPUTING

FIRST LOOK!
Macintosh Plus

EXPLORING THE APPLE II

Desktop

INCLUDING REVIEWS OF CATALYST 3.0 AND MOUSEDESK

PACIFIC BELL'S MAC EXPERIMENT

COMPARING INTERNAL HARD DISKS FOR THE IIe

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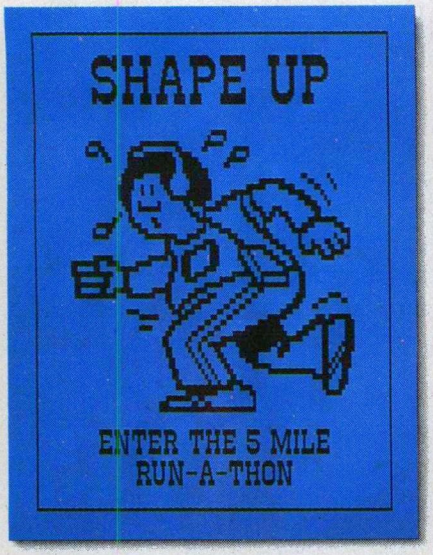

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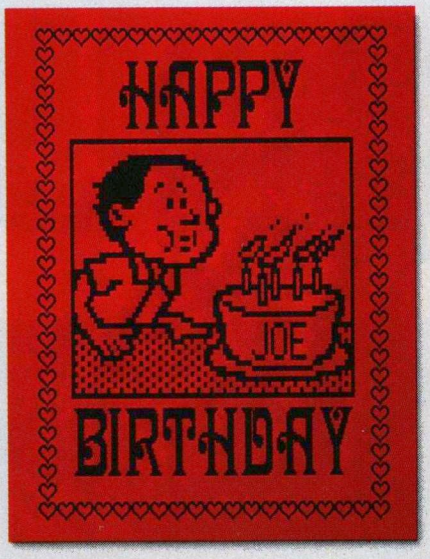

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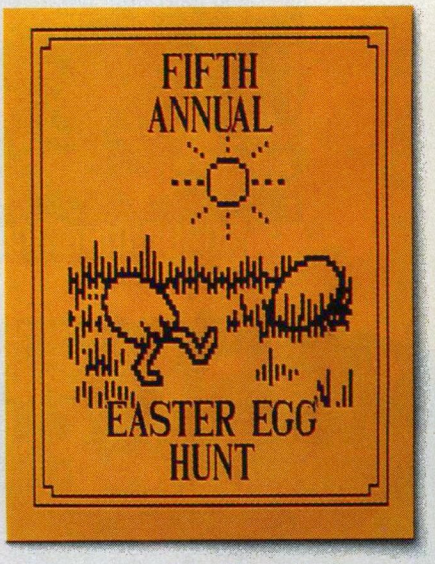

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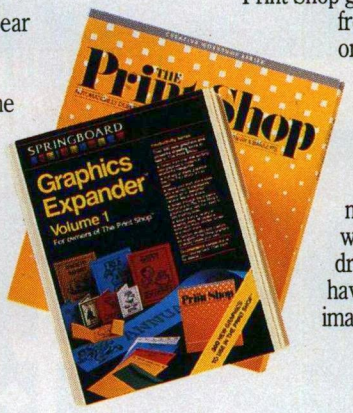
It's easy because the Graphics Expander provides powerful drawing and editing tools



that work just as well with graphics from The Print Shop or The Print Shop Graphics Library.™ You can select from a variety of drawing pens, fill patterns, automatic lines, circles or boxes. Flip graphics left to right or magnify them for detail work. The tools are fun to use and make it easy to personalize your Print Shop creations.

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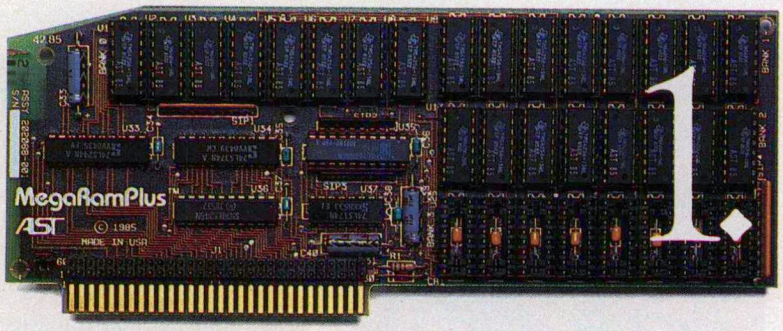

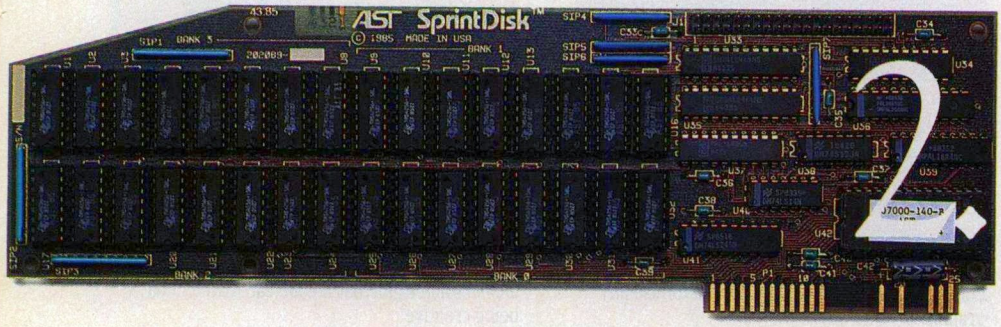

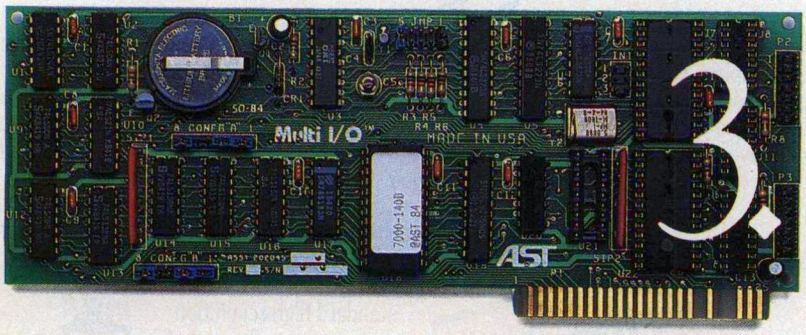

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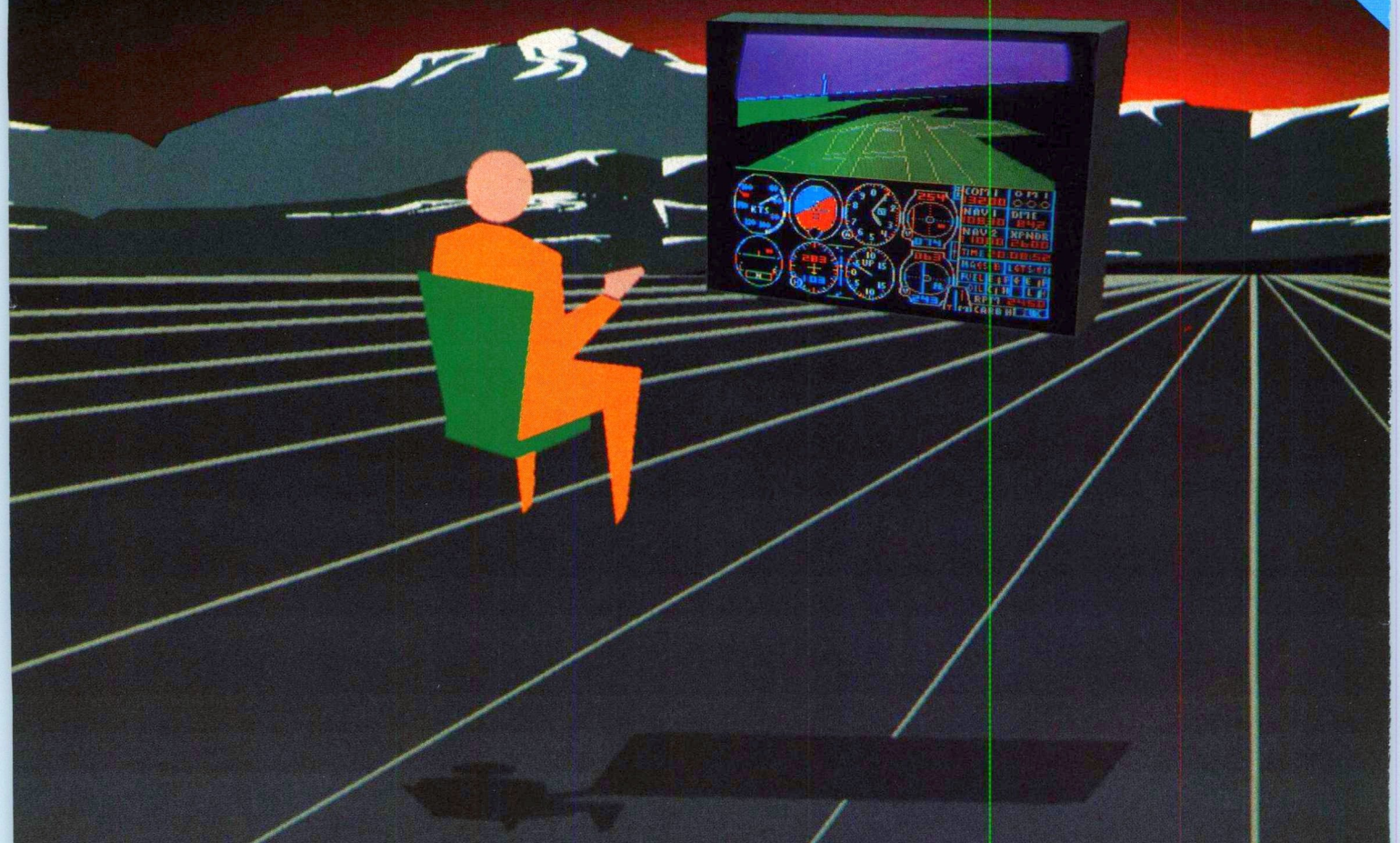

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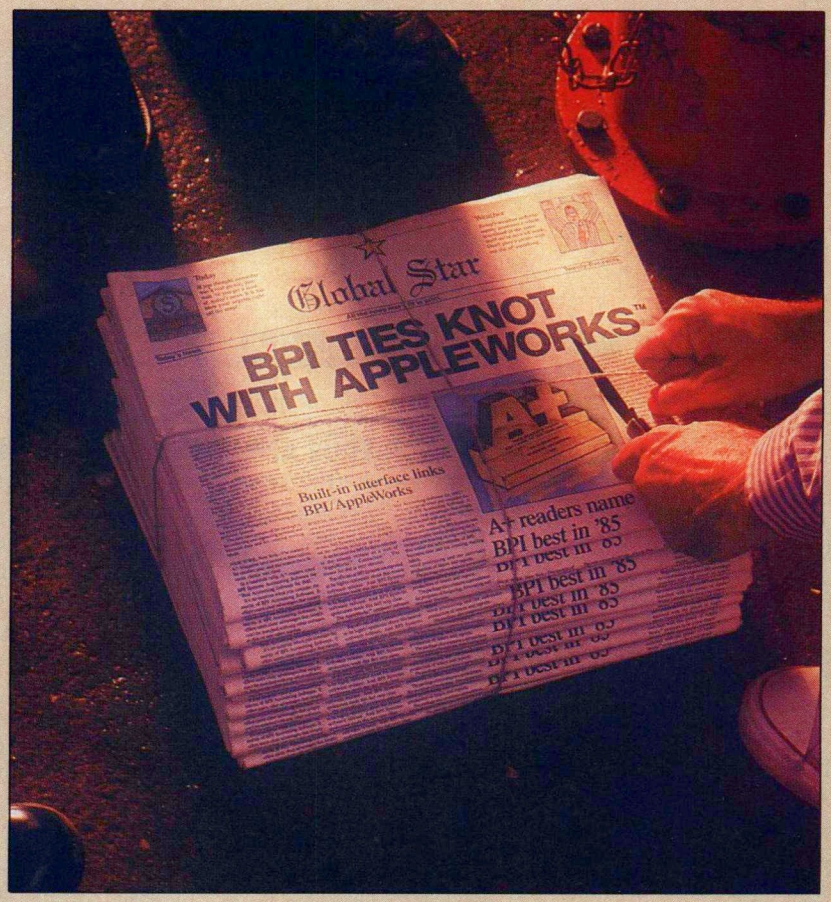

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BY GARY B. LITTLE
Two years have passed since the debut of the Macintosh desktop interface. Not unexpectedly, Apple has started to promote the use of a Macintosh-like interface for Apple IIe and IIc programs. This article covers two such applications, Quark's Catalyst 3.0 and International Solution's MouseDesk program selectors.

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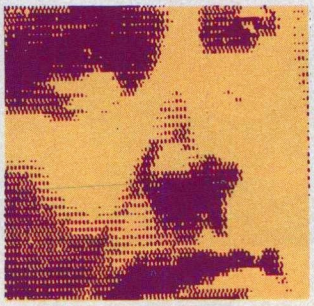
Your Apple II is a world in itself, with its vast capabilities for work and play, for learning and teaching. With video



digitizers, your Apple can now see what you see and bring it back as a file. Discover the world of digitized graphics in this article, which reviews the MicronEye Bullet Video Digitizer, the AFG-III Video Digitizer, and the Computech Diplomat Video Digitizer.

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BY CHARLES A. RUBIN
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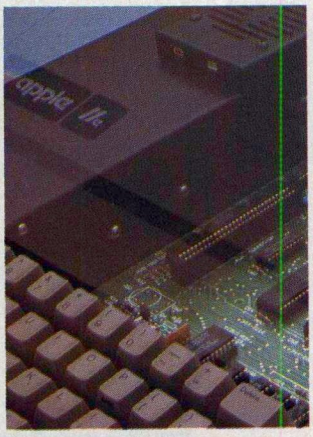

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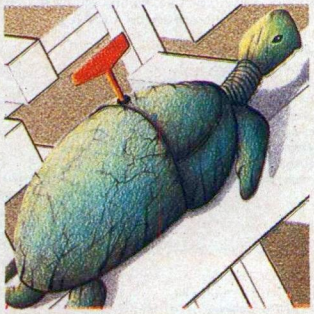

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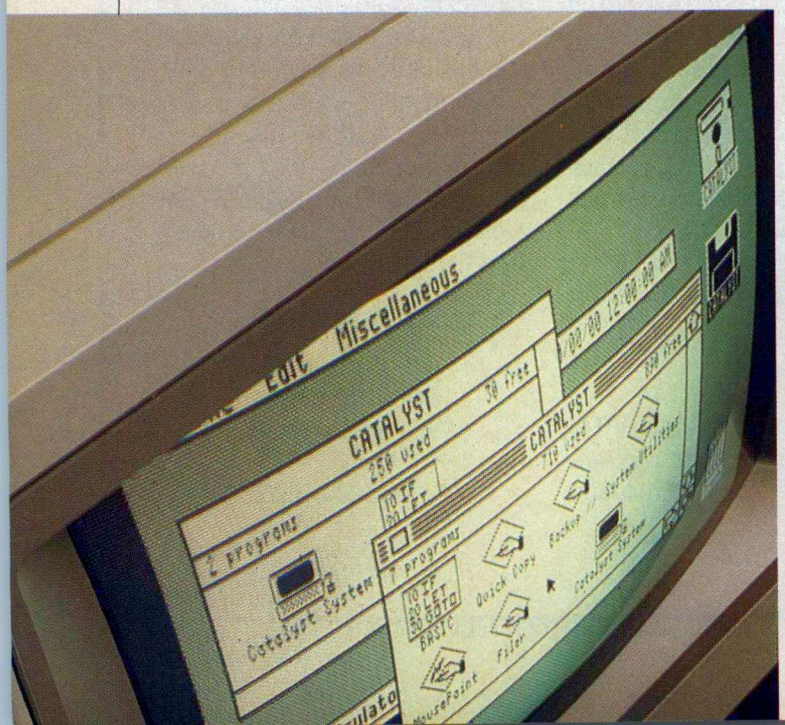

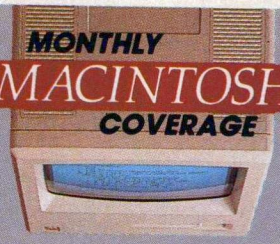

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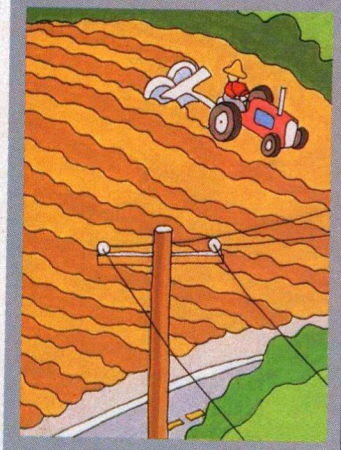
BY STEVE ROSENTHAL
Apple Computer, Pacific Bell, and several telecommunications services are participating in an experimental system to enable your computer and up to four other digital services to share a single standard telephone line with two normal voice conversations.



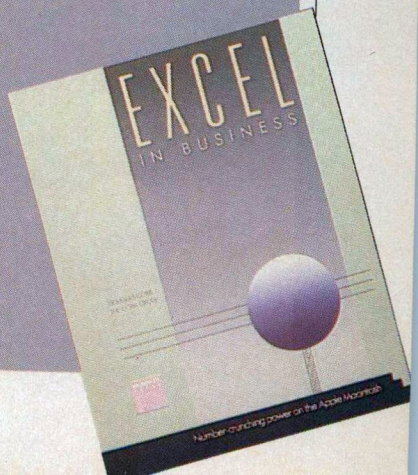
118
THE MAC MAKES NEWS IN THE NEWSROOM
BY CRAIG L. WEBB
The Macintosh is making inroads into newspaper graphics departments nationwide—from the *Todd County Standard* of Elkton, Kentucky, to *USA Today*.

128
NEON
BY DAVID D. THORNBURG
Neon is a new object-oriented programming language with its roots in Smalltalk and Forth. Our reviewer thinks that this language makes the most of the Macintosh.

133
MACTIPS
Suggestions from our readers on extending connections, disposing of locked files, obtaining custom MacDraw patterns, and drawing full-page pictures in MacPaint.

135
BUSINESS ANALYSIS WITHOUT PAIN
BY MICK O'NEIL
The average small-business owner may be a bit hesitant to take an expensive plunge into the world of integrated software and databases and may prefer a specific, task-oriented piece of software. Our reviewer looks at just such a package, Profit Projections/Breakeven Analysis from Harris Technical Systems, Inc.

141
BOOK EXCERPT: EXCEL USER-DEFINED FUNCTIONS
BY DOUGLAS COBB
If you are interested in learning how to program your own built-in functions for Microsoft's Excel, be sure to read this excerpt from Douglas Cobb's book.



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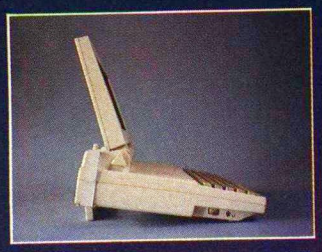

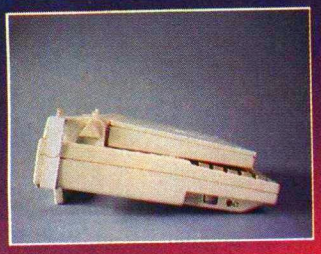

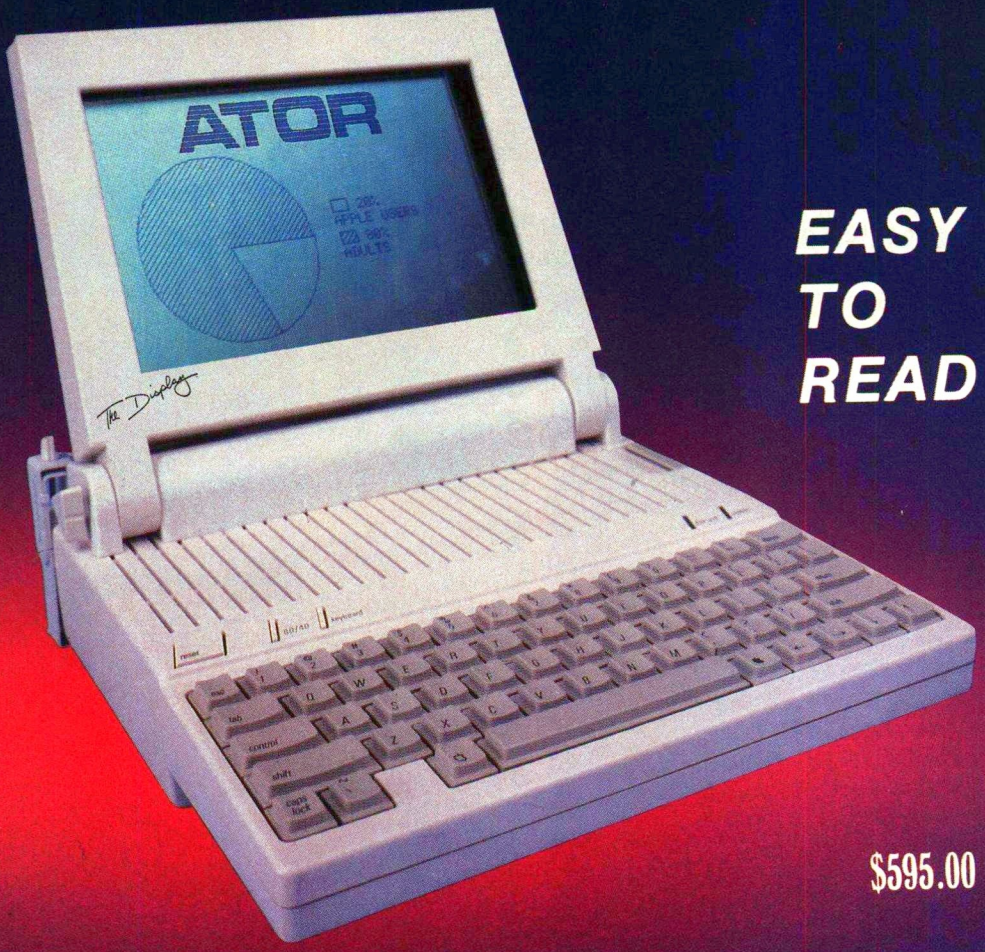

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The Display is a trademark of ATOR Inc.
Apple IIc is a registered trademark of Apple Computer Inc.

Message from Maggie

The last few years have seen some serious attempts to alleviate some of the more frustrating aspects of computing.

COMPUTING DOESN'T HAVE TO BE ARCANE

For a lot of us, microcomputers are bascially pretty arcane. From setting DIP switches to connecting peripherals to finding a file, operating computers can make even the most seasoned users occasionally think about throwing their computers out the window. The last few years, however, have seen some serious attempts to alleviate some of the more frustrating aspects of computing.

The advances that are the results of these attempts are in evidence today. The core of the software advances is an area known as artificial intelligence (AI), which is increasingly becoming a popular concept in the personal-computer industry. AI is popular because many people believe it will solve the dilemmas inherent in operating a machine that doesn't think like we do. The name derives from the hope eternal that we can make the computer think and communicate in a human way. Because of these expectations, the definition of AI has actually expanded to mean various different things, encompassing everything from natural-language interfaces to expert systems. If you are interested in what artificial intelligence is and how it affects the software you use now and will use in the future, please read David Thornburg's "Artificial Intelligence" article beginning on page 54 of this issue.

If artificial intelligence involves the core of a computer, so the user interface is at the surface. In order to make computers easier to manipulate, some computer programmers came up with a user interface that is based on something we all know and use: the desktop. The desktop metaphor is definitely a major trend. Since Apple brought it to everyone's attention with the introduction of the Macintosh, this convenient interface is rapidly becoming a standard. Not only are IBM software developers adopting similar concepts with pull-down menus, visible file folders, and trash cans, but almost any new software developed in the next few years will follow the lead, including Apple II software.

Many of you have probably seen this coming, and you're right. Apple is committed to this desktop interface for its entire product line. As a result, we thought you would be interested in seeing several examples of this kind of software, so we had Gary Little take Apple's Catalyst 3.0 and International Solutions' MouseDesk for a spin. To find out how these programs stood up to Little's in-depth scrutiny, be sure to read his article, "Exploring the Apple II Desktop," on pages 34–41.

Finally, for the large percentage of our readers who are considering buying a Macintosh, we have details on the new Macintosh Plus, which was introduced on January 16. This new product from Apple addresses many of the issues, such as speed and memory, that critics brought up when the Mac was introduced in 1984. Having heeded the criticism, Apple has upgraded the Mac to compete in the world of increasingly powerful microcomputers. In this issue, we are providing some information on its basic specifications in "NewsPlus" and a commentary from Steve Rosenthal in "Thoughtware." Next month, we will provide an in-depth technical analysis of the changes that make the Macintosh more powerful. +

Maggie Canon

MAGGIE CANON/**EDITOR IN CHIEF**

Goodbye Floppies, Hello 20 MByte.

New from First Class Peripherals:
The Sider II 20 MByte Winchester Hard Disk Storage
and Tape Backup Unit for your Apple II+ or IIe

The New Sider II will bring your *Apple II+* or *IIe* to a significantly increased level of performance. You'll gain 20 MByte of storage plus the great advantage of being able to boot directly off the hard disk. Further, the Sider II disk is partitionable—you can allocate four operating systems on the same disk: Apple DOS 3.3, Pro Dos™, Apple Pascal, and CP/M®.

You require even more than 20 MByte storage? No problem. Simply daisychain with additional Sider units to increase mass storage.

NEW. B-Sider Tape Backup.

Backup copy capability is an important part of any mass storage system. Tape backup provides great advantages over floppies for archiving, and that's why First Class Peripherals has responded to user requests and now offers the excellent B-Sider 20 MByte tape backup unit. The new B-Sider is priced at only $695.

Features: Full image, operating system and volume backup and restore. File by file restore using wildcards. Backup to tape drive or to floppy disk. Will support Apple's Unidisk 3.5 800K floppy.

First Class Peripherals leads the industry in providing precisely the subsystems which users seek. Even more to your benefit are our prices—prices made possible solely because you buy direct.

The new Sider II, totally equipped to 'plug and play,' is only... **The new B-Sider tape backup is just...**

$995. $695.

And, the popular Sider 10 MByte hard disk is $695. By buying direct, you save—really save!

Quality? Reliability? Have no doubts First Class Peripherals subsystems are backed by Xebec, a respected computer industry leader. Further, our thousands of satisfied customers provide top evidence that we offer the finest, easiest-to-install Winchester hard disk subsystems available, and for the best price by far!

To complete this remarkable offer, Sider II, Sider, and B-Sider arrive with a money-back guarantee. Use any of the units for 15 days. If you are not satisfied, return it for a full refund. All units have a full one-year limited warranty and are supported by a convenient toll-free service and technical hotline you can call anytime.

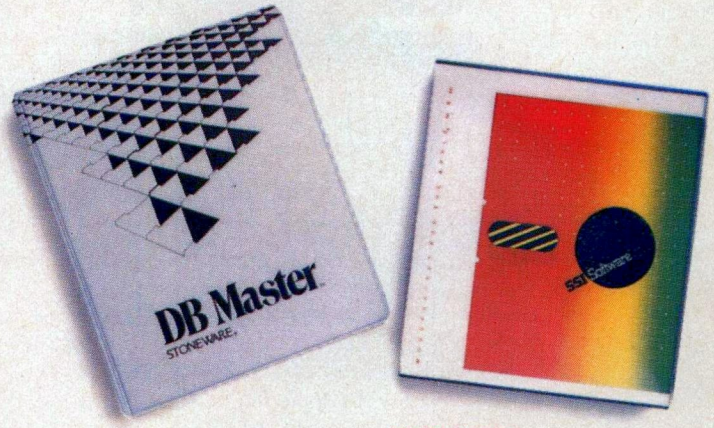
Order Now. Say 'goodbye' to floppies and provide your system with new speed, convenience and performance. Use the provided coupon or, for faster service, order by phone and charge to your VISA, MasterCard, or American Express. (We also welcome your questions and technical concerns.) Call toll-free: **1-800-538-1307**

Extension 116.

II+ owners—Revision 7 or greater is required on your motherboard.

Apple and Pro DOS are trademarks of Apple Computer, Inc. CP/M is a registered trademark of Digital Research, Inc.

Sider and Sider II units include Winchester hard disk drive, Apple adaptor board, cable, complete installation software and documentation.



Introductory Period BONUS!

SSI WordPerfect 1.0 and Stoneware DB Master programs. You receive your choice of One FREE!

Order your Sider II, Sider, or B-Sider now and you will receive the FREE program you select along with your order. SSI's WordPerfect 1.0. is the word processor program described by *InfoWorld* '...as close to perfect as you can get.' The Stoneware DB Master is acclaimed by reviewers and users as the best accepted Apple II DBMS program for business people and professionals. Both programs are leaders, and you can receive one free through this exceptional opportunity. Offer good thru April 30, 1986.

Yes, I'm eager to benefit from First Class subsystems performance.

Please send the item(s) indicated:

☐ 20 MByte Sider II @ $995 + $15*
☐ 10 MByte Sider @ $695 + $15*
☐ B-Sider tape backup @ $695 + $15*

Total Cost: $_____

Residents of CA and NV please add appropriate sales tax.
Purchase order accepted. Please add $100 per unit.

I prefer to pay as follows:

☐ Check or money order (payable to First Class Peripherals) enclosed
☐ Bill the following credit card account:
☐ VISA ☐ MasterCard ☐ American Express

CARD #

*Shipping and Handling SIGNATURE

Name

Address

City

State Zip

Telephone (& area code)

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Offer good thru April 30, 1986.

Mail to: FIRST CLASS PERIPHERALS 3579 Highway 50 East Carson City, NV 89701

CIRCLE 154 ON READER SERVICE CARD

Let's compare Apples™ to Apples™.

An Apple IIc

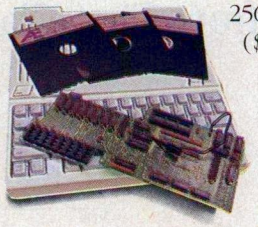
An Apple IIc with Z-RAM

The Apple IIc on the right works exactly the same as the Apple IIc on the left. Almost. The Apple on the right has a powerful memory expansion coprocessing card called Z-RAM. From Applied Engineering. Which means the Apple on the right can completely load AppleWorks into RAM—and then run it up to thirty times faster than the Apple on the left.

Z-RAM also acts as a solid-state disk drive. Which means the Apple on the right will load and store programs up to 30 times faster. And, our included RAM disk is compatible with Applesoft, PRO-DOS, DOS 3.3, PASCAL and CP/M.

Turbo Charged AppleWorks.

Even a 256K Z-RAM can completely load AppleWorks into RAM. With Z-RAM, the moment your fingers touch the keyboard AppleWorks responds. A 256K Z-RAM lets your IIc run AppleWorks up to 30 times faster, increases available desktop to 235K and maximum number of records from 1,350 to over 15,000, quadruples the number of lines allowed in the word processor, provides a print spooler, and auto-segments large files so they can be saved on two or more disks. A 512K Z-RAM boosts AppleWorks desktop to an incredible 425K.



Take a closer look.

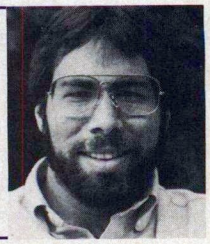
There's more. Z-RAM has a built-in high speed Z-80B microprocessor that allows you to run CP/M programs. Which means you now have access to the single largest body of software in existence, including popular packages like WordStar, dBase II, Turbo PASCAL and Microsoft BASIC. A 16 bit option is also available.

And still more. Z-RAM is compatible with all IIc software and hardware, installs easily in just ten minutes with a screwdriver (slightly longer without), is available with 256K or 512K of additional memory (a 256K Z-RAM can be upgraded to 512K at any time). Z-RAM is easily handled by the IIc power supply with our patent pending power saving design.

The only thing better than that would be a recommendation from Steve Wozniak.

"I recommend Applied Engineering products whole-heartedly." (Of course, Steve's IIc has a Z-RAM installed.)

Steve Wozniak, the creator of Apple Computer



For fast response.

Z-RAM comes complete with simple instructions, RAM disk software, Z-80 operating system, CP/M manual. And a five year "hassle free" warranty. Make a good Apple great. With 256K Z-RAM "384K total" ($329); with 512K "640K total" ($389); 16 bit option may be added later ($89).

If you want to run CP/M software, but don't need more memory, we suggest our Z-80c card. The Z-80c has no memory expansion ports and is priced at only $159.

Call 214-241-6060 TO ORDER TODAY. 9 a.m. to 11 p.m. Seven days, or send check or money order to Applied Engineering. MasterCard, Visa and C.O.D. welcome. Texas residents add 5⅛% sales tax. Add $10.00 outside U.S.A.

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(214) 241-6060

Letters

We invite your comments.

PORTABLE IIc MONITOR

Dear A+: After reading many editorials and hearing of customer complaints about Apple's liquid-crystal-display monitor for the Apple IIc, I am well aware of the poor performance of the product.

My search for a decent monitor to take with me on road trips was fruitless until I heard about a small monitor made by Xcalibur in England. Recently, while my wife and I were on a vacation trip to Great Britain, I called Xcalibur and talked to Jeffrey Barringer, one of the owners of the company. He agreed to bring a monitor to my hotel when I arrived in London and give me a demonstration—talk about service!

The CRT viewing size is small (4 inches wide by 3 inches high) but adequate for my use. The overall dimensions of the unit are 4 × 6 × 9 inches. I found it very easy to pack in a small camera case with my IIc, external drive, and all cords. The screen is green, which is exactly like my standard Apple IIc monitor. There is only one control, the intensity adjustment, located at the rear. You can read the screen in any ambient light. All you do is plug it into the port in the rear of the IIc, and you are in business. It takes its power from the computer, so you don't have a power cord. Someday, someone may make a flat, portable, readable display, but until then, this is the best I have seen. If you're interested, contact

Xcalibur Computers Ltd.
Spencer House 3 Spencer Parade
Northampton NN1 5AB
England
(0604)21051/4

Oh yes, the cost is less than $200.

John A. Hogan
Belmont, CA

HACKER AD RAISES READER'S IRE

Dear A+: As an assistant sysop on a computer bulletin board, I was shocked to see the advertisement in the November 1985 *A+* (page 119) regarding the program Hacker from Activision. I honestly can't believe that any reputable software company would actually market software that glorifies "stumbling into someone else's computer system."

I see nothing "clever" or "smart" about trespassing into someone else's computer and doing damage to many hours of hard work just for the thrill of "hacking." I also feel that by glorifying the act of hacking, Activision is helping to bring about changes that will be detrimental to my hobby of telecommunications.

In answer to the advertisement's question "You've Stumbled Into An Unknown Computer System. Now What?" I'd like to say, "Hang Up and Don't Call Back."

Please think about what advertisements and software such as this do for computer telecommunications.

Jim DeNike
Okemos, MI

The following is a reply to Jim DeNike from Charlotte Taylor of Activision.

We regret that our advertisement in *A+* led you to the conclusion that our Hacker package encourages one to cause damage to someone else's computer system. In fact, if you were to obtain a copy of the program for yourself, you would discover that the ultimate object of the computer mystery is to learn as much as possible about the curious computer system you have stumbled into and then (in a legal manner) stop it from causing illegal and monumental damage to you and your environment.

As an active member of the Software Publisher's Association, Activision does not condone the break-in and tampering with of privately owned computer systems, nor do we attempt to teach that procedure in Hacker. As a victim of software pirating, we can empathize with your concern for the maintenance of computer telecommunications systems.

In a recent review of Hacker printed in *InfoWorld*, a computer-security expert labels Hacker as fun and harmless—exactly what we intended it to be. Hacker was designed with the curious adventurer in mind—not the computer criminal.

Charlotte Taylor
Marketing Communications
Activision, Inc.
Mountain View, CA

For our review of Hacker, see this month's "That's Entertainment."—Ed.

MISPLACED C PROVES MISLEADING

Dear A+: In the December issue of *A+*, your chart of speedup boards (page 61) listed the Accelerator IIe, made by Titan Technologies, as having a 65C02 for a CPU. This is not true. The Accelerator IIe has a 6502C, and there is a distinct difference between the two. The 65C02 is the current CPU for the Apple IIc computer and has several new assembly instructions built into it. The 6502C is a 3.6-MHz version of the 6502, 6502A, and 6502B, all of which are virtually the same chip.

Timothy C. Benham
Seattle, WA

SLOT-BUSTER FOLLOW-UP

Dear A+: The article "Plug-in Devices for Every Need: Input/Output" (December 1985, pages 32–42) provided a good overview of multifunction cards. However, the article stated on page 41 that a multifunction card's "... extra interfaces are assigned to other unused slots on the IIe, even though the card does not physically

FREE? DISKETTES

SAVE MONEY! Apple II series users can use the diskette flip side, if another "write enable" notch is correctly made.

TOP NOTCH by QUORUM quickly **SOLVES** that **PROBLEM.**

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"The best I've found. . ."
IAC Reviewer

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BE SAFE! The flipside of a single sided disk may have flaws. Any disk is **CERTIFIED 100% ERROR FREE** with CERTIFIX. **IT "LOCKS OUT" BOTH DOS 3.3 & ProDOS DISK FLAWS.**

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- RECORDS TEST DATE onto disk
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Prevent Data Loss!
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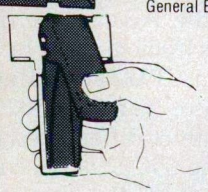
U.S.Naval Weapons Research Center
Alcoa • Rockwell International
General Electric Corporation



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OAKLAND, CA 94614

CIRCLE 223 ON READER SERVICE CARD

occupy those slots . . . Multifunction cards are a bit tricky to install, since you usually have to set a lot of switches in order to select which phantom slots are to be used . . ."

I would like to point out the Slot-Buster multifunction card mentioned in the article does *not* use phantom slots, nor does it require that a lot of switches be set to define its functions. The Slot-Buster uses a novel technique whereby different functions can be activated through the use of simple software commands; two switches determine the default (power-up) function of the card.

The table on page 44 failed to show that the Slot-Buster includes its own printer and synthesizer buffers (which also allow the parallel and serial ports to be used simultaneously). The "Computer" column in the table also leads one to believe that the Slot-Buster is not compatible with the Apple II Plus, when, in fact, it is.

Randy Carlstrom
President
RC Systems, Inc.
Bothell, WA

SATISFIED SLOT-BUSTER CUSTOMER

Dear A+: I just read your article "Plug-in Devices for Every Need: Input/Output" in the December 1985 issue (pages 32–42). As an owner of a Slot-Buster multifunction card, I was interested in the way this card was rated compared to other cards on the market. As I read the article, it became apparent that the author was partial to Street's BusinessCard without having had the courtesy to research the other cards on the market.

I have had a Slot-Buster by RC Systems for six months now, and I am very pleased with it. I was disappointed in the fact that the features of the Slot-Buster were either hidden in the fine print or buried in the text of the article. Here's a list of some of them:

(1) speech synthesizer with unlimited vocabulary; (2) buffered serial printer port up to 24K; (3) buffered parallel printer port up to 24K; (4) use of only one slot without phantom slot addressing; (5) software disk with Spanish rules, spelling program, and utility programs for writing rules and graphics dumps.

The support has been great from RC Systems. Four months after I received my card, RC Systems upgraded its product to allow the use of the open-apple/closed-apple keys to clear the printer buffer when you start to print a file from AppleWorks before you're ready. This modification arrived with very good documentation and was easy to install.

At this time, I'm waiting for RC's next multifunction card with a ProDOS clock and up to 280K printer buffer, which can be used with either a serial or parallel port. After using the Slot-Buster card, I'm confident that this company's next product will function as well as the Slot-Buster.

Matthew Leyda
Edmonds, WA

APPLE III COMPANIONSHIP

Dear A+: We wish to express our appreciation to you for your recommitment to the more than 100,000 Apple III owners and users in the U.S. Apple III owners seem to be the "forgotten" people (ex-customers) in Apple's corporate growth. The III is truly a fantastic machine—in our minds, the best Apple ever produced.

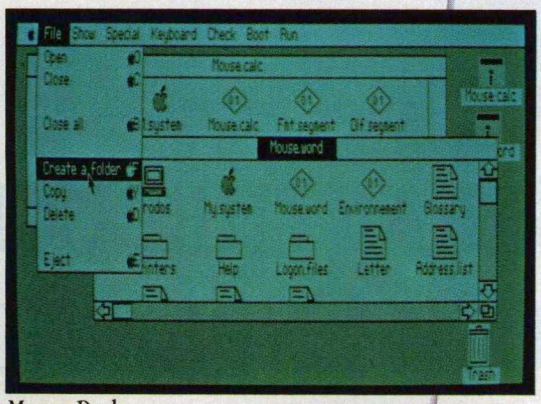
Advertised incorrectly as a "small business" machine only, the III has increasingly become a "personal" computer to tens of thousands.

I read Dr. Ford's letter regarding an Apple III users' group in the San Francisco Bay Area in your October issue and would like to inform your readers of several other III users' groups, including ours:

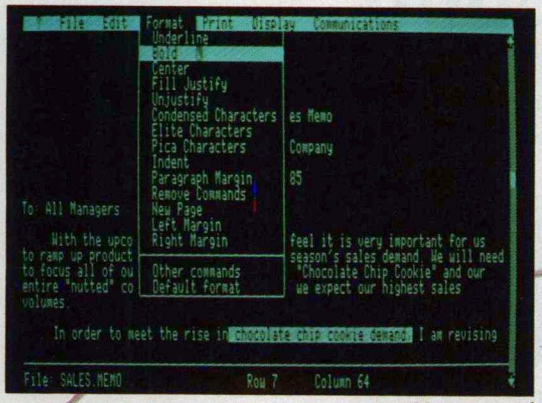
- TAU
  c/o Lavona Rann
  1113 Wheaton Oaks Drive
  Wheaton, IL 60187
  (Ranks with Apple III Users of Northern California in activity)
- North Jersey Apple III Users Group
  c/o Roger Richardson
  P.O. Box 251
  Allanuchy, NJ 07820
  (Good, but less active)
- Baud Appleing Computer Club
  c/o Thomas E. Linders
  P.O. Box 991
  APO NY 09098
  (Active III SIG in Germany)
- III Mailbox Bulletin Board (members in Brazil, Canada, China, Denmark, and the U.S.—see our most current information below)

The Apple III Owners & Users Group International is an independent, nonprofit organization for all Apple IIIers without a *local* users' group or not connected to one via a modem (or any other IIIer). Started in 1983 in Naples, Italy, we publish a monthly newsletter, the *Apple III*

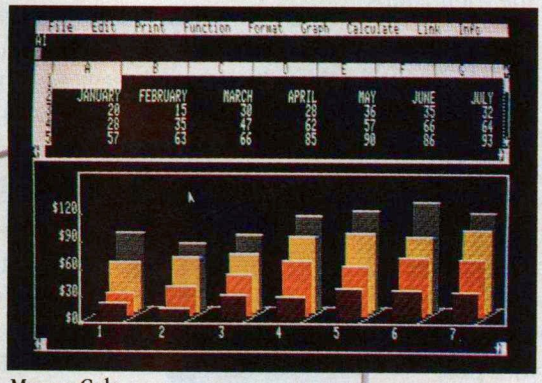
The Inside Line on the New Apple II



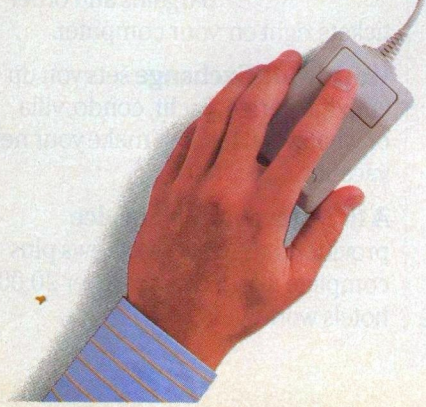
Mouse Desk



Mouse Word



Mouse Calc



Mouse Series:™ the *first* line of software to take full advantage of all the recent advances on the Apple II.

Because it's mouse-based, the Mouse Series brings to the Apple II all the convenient features of the Macintosh™ – icons, windows, pull-down menus... Everything is just a point and click away.

How to Switch Programs... Without Switching Disks...

With Mouse Desk,™ changing programs is like using remote control on a T.V. Use the mouse to switch quickly from program to program, or copy and delete files visually, by "dragging" icons.

Mouse Desk – the right choice, when you've got so much to choose.

How to Avoid the Draft...

With Mouse Word,™ make your first drafts final drafts. Quickly cut, paste, and boldface text with a simple point and click. Compose letters and reports, then get them into circulation fast with Mouse Word's mail-merge or communications options.

For unmatched power and ease of use, choose Mouse Word... the best word processor on the Apple II today.

How to Move Mountains of Data...

Mouse File,™ the newest Mouse Series program that gives you the power to push data around. Mouse File makes it easy to keep your important records *organized.* And lets you design reports visually, using the mouse and Mouse File's built-in design characters.

Put Mouse File on your shopping list – and put an end to data pushing you around.

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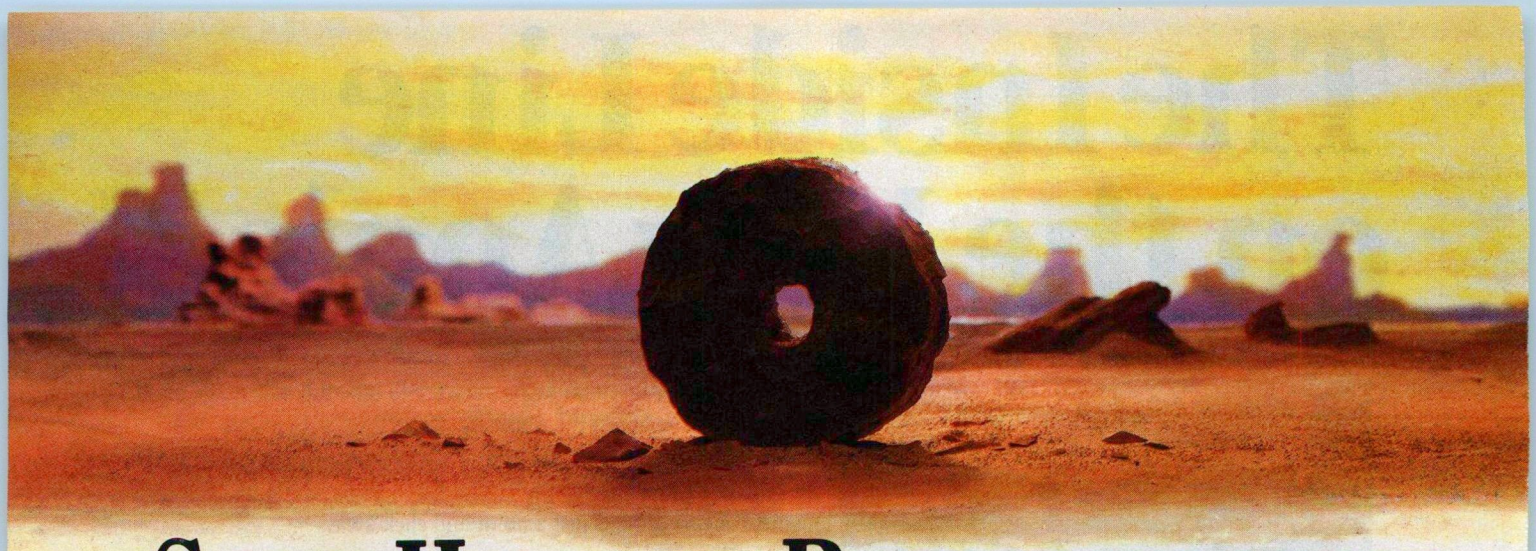
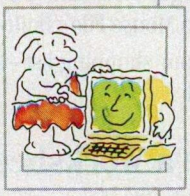


SOME HISTORIC BREAKTHROUGHS DON'T TAKE AS MUCH EXPLAINING AS COMPUSERVE.

But then, some historic breakthroughs could only take you from the cave to the tar pits and back again.

CompuServe, on the other hand, makes a considerably more civilized contribution to your life.

It turns that marvel of the 20th century, the personal computer, into something useful.



Unlike most personal computer products you read about, CompuServe is an information service. It isn't software. It isn't hardware. And you don't even have to know a thing about programming to use it. You subscribe to CompuServe —and 24 hours a day, 7 days a week, it puts a universe of information, entertainment and communications right at your fingertips.

A few of the hundreds of things you can do with CompuServe.

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EasyPlex™ Electronic Mail lets even beginners compose, edit, send and file messages the first time they get online. It puts friends, relatives and business associates—anywhere in the country —in constant, convenient touch.

CB Simulator features 72 channels for "talking" with thousands of other enthusiastic subscribers throughout the country and Canada. The chatter is frequently hilarious, the "handles" unforgettable, and the friendships hard and fast.

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Our full range of games includes "You Guessed It!", the first online TV-style game show you play for real prizes; and MegaWars III, offering the ultimate in interactive excitement. And there are board, parlor, sports and educational games to play alone or against other subscribers throughout the country.

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THE ELECTRONIC MALL™ gives you convenient, 24-hour-a-day, 7-day-a-week shopping for name brand goods and services at discount prices from nationally known stores and businesses.

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Travelshopper℠ lets you scan flight availabilities (on virtually any airline — worldwide), find airfare bargains and order tickets right on your computer.

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Grolier's Academic American Encyclopedia's Electronic Edition delivers a complete set of encyclopedias right to your living room just in time for today's homework. It's continuously updated ... and doesn't take an inch of extra shelf space.

The College Board, operated by the College Entrance Examination Board, gives tips on preparing for the SAT, choosing a college and getting financial aid.

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Healthnet will never replace a real, live doctor—but it is an excellent and readily available source of health and medical information for the public.

Human Sexuality gives the civilization that put a man on the moon an intelligent alternative to the daily "Advice to the Lovelorn" columns. Hundreds turn to it for real answers.

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All the latest news is at your fingertips. Sources include the AP news wire (covering all 50 states plus national news), the Washington Post, USA TODAY Update, specialized business and trade publications and more. You can find out instantly what Congress did yesterday; who finally won the game; and what's happening back in Oskaloosa with the touch of a button. And our electronic clipping service lets you tell us what to watch for. We'll electronically find, clip and file news for you...to read whenever you'd like.

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Comprehensive investment help just might tell you more about the stock you're looking at than the company's Chairman of the Board knows. (Don't know who he is? Chances are, we can fill you in on that, too.) CompuServe gives you complete statistics on over 10,000 NYSE, AMEX and OTC securities. Historic trading statistics on over 50,000 stocks, bonds, funds, issues and options. Five years of daily commodity quotes. Standard & Poor's. Value Line. And more than a dozen other investment tools.

Site II facilitates business decisions by providing you with demographic and sales potential information by state, county and zip code for the entire country.

National and Canadian business wires provide continuously updated news and press releases on hundreds of companies worldwide.

GET SPECIALIZED INFORMATION

Pilots get personalized flight plans, weather briefings, weather and radar maps, newsletters, etc.

Entrepreneurs use CompuServe too for complete step-by-step guidelines on how to incorporate the IBMs of tomorrow.

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And now for the pleasant surprise.

Although CompuServe makes the most of any computer, it's a remarkable value. With CompuServe, you get low start-up costs, low usage charges and local phone-call access in most major metropolitan areas.

Here's exactly how to use CompuServe.

First, relax.

There are no advanced computer skills required.

In fact, if you know how to buy breakfast, you already have the know-how you'll need to access any subject in our system. That's because it's "menu-driven," so beginners can simply read the menus (lists of options) that appear on their screens and then type in their selections.

Experts can skip the menus and just type in "GO" followed by the abbreviation for whatever topic they're after.

In case you ever get lost or confused, just type in "H" for help, and we'll immediately cut in with instructions that should save the day.

Besides, you can either ask questions online through our Feedback service or phone our Customer Service Department.

How to subscribe.

To access CompuServe, you'll need a CompuServe Subscription Kit, a computer, a modem to connect your computer to your phone, and in some cases, easy-to-use communications software. (Check the information that comes with your modem.)

With your Subscription Kit, you'll receive:

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- a complete hardcover Users Guide.
- your own exclusive user ID number and preliminary password.
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Call **800-848-8199** (in Ohio, 614-457-0802) to order your Subscription Kit or to receive more information. Or mail this coupon.

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COPY II PLUS
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BRINGS YOU THESE PRODOS AND DOS 3.3 UTILITIES:

- Copy files, disks, even entire subdirectories.
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This product is provided for the purpose of enabling you to make archival copies only.

CIRCLE 318 ON READER SERVICE CARD

Brainy Buffer.

Do you press print and wait? And wait? And wait?

Your waiting is over with the Universal Data Buffer — it frees your computer in seconds while it handles the printing of your file.

And the Universal Data Buffer from HanZon is smarter than the average buffer. For one thing it has two inputs—one serial and one parallel, and two outputs—one serial and one parallel. Since all the ports are active, it means the Universal Data Buffer can interface between serial and parallel devices — even at different speeds and protocols. All that is a bonus to its standard function - as a 64K buffer expandable to 256K. The buffer also has operator controls for selecting additional copies, and pausing.

Call HanZon today for your nearest dealer:
(206) 487-1717.

Suggested Retail Price: $385 - 64K Buffer
$59 - 64K Expansion Module

HANZON
HANZON DATA INC. • 18732 142nd Ave NE • Woodinville, WA 98072

CIRCLE 216 ON READER SERVICE CARD

News & Views, which contains III news gleaned from every source possible, attempts to answer or obtain answers to members' questions, and is building a library of *every* piece of Apple III public-domain software available. Annual dues are $5 in the U.S. ($6 in Canada, $20 foreign), but this may change as we grow.

Software is $3 per disk (members only, U.S. postage included; $3.50 in Canada; $7.50 foreign—all payments are in U.S. dollars).

Here's the address: Apple III Owners & Users Group International, c/o H. Joseph Dobrowolski, P.O. Box 913, Langley AFB, VA 23665.

H. Joseph Dobrowolski
President
Apple III Owners & Users Group International
Langley AFB, VA

BUYERS BEWARE

Dear *A+*: I've been looking for a good, fast, inexpensive spelling checker for AppleWorks for a long time, and I bought Advanced Logic Systems' Spellworks, thinking I had found it. What I found instead is quite possibly the most worthless program I've seen in years.

Spellworks counts words in a document and checks them against a built-in dictionary or a personal dictionary, just as other spelling checkers do. After it does this, however, Spellworks writes all the misspelled words into a separate AppleWorks file in alphabetical order. You must then manually compare the words in that file with your original document and correct the misspellings one at a time. Since this method forces you to read through a document word by word anyway, you might as well proofread the text and find the misspellings yourself. Spellworks' modus operandi thus defeats the purpose of a spelling checker, which is to find and locate misspelled words in context and then give you the chance to replace them as they are encountered.

Displaying and replacing misspelled words in context has long been a standard feature of spelling programs, and I'm at a loss to understand why ALS chose to market a product that lacks this essential ability. I can only hope that other *A+* readers will save themselves $49 and avoid Spellworks.

Charles Rubin
Oakland, CA

Want More AppleWorks™ Power?

You could put an Apple™ 1 meg memory expansion card in slot 4 and add another Apple 1 meg memory expansion card in slot 5 (Apple's card only expands to 1 meg). You'll need a separate 80 column card for the auxiliary slot. Oh, and put a printer buffer card in slot 2. If you want RGB color, you'll need an RGB board in slot 7 then buy a hard disk (if you have any slots left).

You'll have a bigger AppleWorks desktop, but you'll still be limited to a maximum of 1350 records in the data base. And you're stuck at 2250 lines in the word processor. And AppleWorks won't automatically load itself into memory, and make sure you don't create a file bigger than your disks can hold because Apple's memory card won't segment a file onto multiple disks.

Or
You could get RamWorks II®!

You'll have a bigger desktop.

You'll also have up to 15,200 records (not 1350) in the data base and up to 15,200 lines in the word processor (not 2250). AppleWorks will now automatically load into RAM. And if you create a file greater than your disk capacity, no problem. RamWorks II will automatically save it on multiple disks. And because of our built-in printer buffer, you can continue to use AppleWorks while your printer is printing. Nice. RamWorks II has an RGB option, 16 bit option and is expandable to 3 megabytes. And don't forget, RamWorks II is the software industry standard for memory expansion in the IIe. RamWorks II is automatically recognized by virtually all memory intensive programs (and many more are on the way) and is 100% compatible with all IIe software and hardware. So save your money and save your slots for other peripherals. Order RamWorks II today! Want more info? Just turn the page.

	RamWorks II®	Apple's™ Card
Maximum Desktop	2277K	1012K
Maximum Number of Records in Database	15,200	1350
Maximum Number of Lines in Word Processor	15,200	2250
Autoloads AppleWorks	YES	NO
Auto Segments Files	YES	NO
Built-in Printer Buffer	YES	NO
Compatible With All Versions of AppleWorks	YES	NO
Displays Time & Date on AppleWorks Screen with Clock	YES	NO
Saves Slots	YES	NO
RGB Option	YES	NO
16 Bit Co-Processor Port	YES	NO
Memory Expansion Port	YES	NO
Patent Pending Power-Saving Circuit	YES	NO
80 Columns Built-in	YES	NO
CP/M RAM Disk	YES	NO
Compatible with Franklin 2000 Software	YES	NO
Maximum Total Functions	6	1
Software Standard	YES	YES
Manufactured in	USA	Singapore
Warranty	5 years	90 days
Price with 256K	$219	$299

AE™

APPLIED ENGINEERING
"We Set the Standard"

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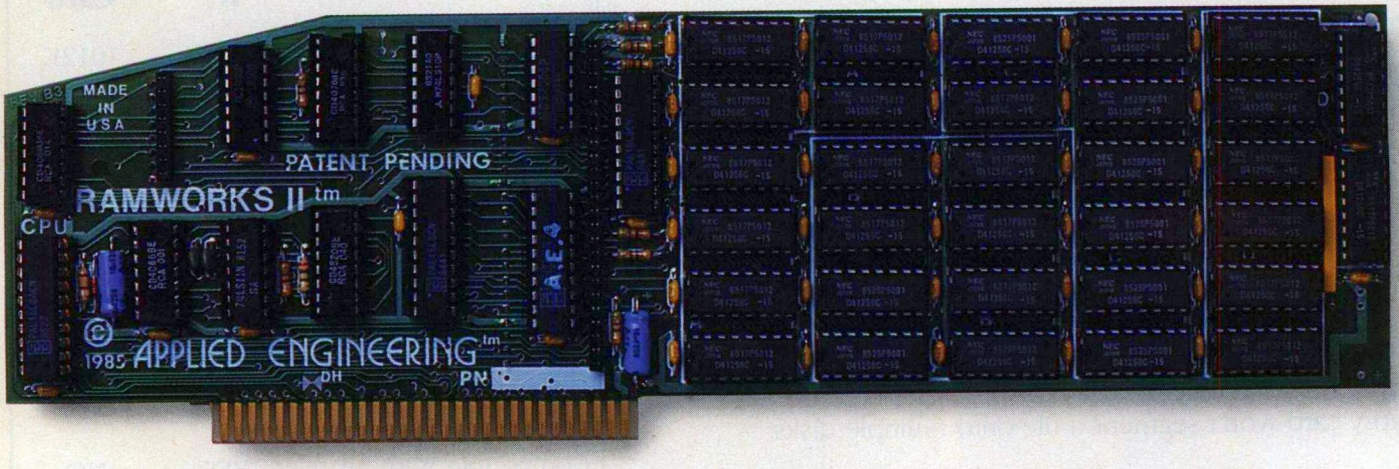
Meet RamWorks II®

The Recognized Industry Standard For Memory Expansion of the Apple IIe.



RamWorks II. A Generation Ahead. Again.

The best selling expansion card for the Apple IIe just got even better. With RamWorks II, expand your IIe to an incredible 3 megabytes of usable RAM.

Turbo Charged AppleWorks.

RamWorks II plugs into the IIe auxiliary slot and acts just like Apple's extended 80 column card, only better—because if you buy a 256K or larger card, AppleWorks will automatically load itself into RamWorks II. This dramatically increases AppleWorks' speed and power because it effectively eliminates the time required to access disk drive 1. Now, switch from word processing to spreadsheet to database management at the speed of light. AppleWorks responds the moment your fingers touch the keyboard.

But AppleWorks has certain internal limits, independent of available memory. Fear not. Only RamWorks II (and the original RamWorks of course) removes those limits. Only RamWorks II increases the maximum number of records available from 1,350 to over 15,000. Only RamWorks II actually increases the number of lines permitted in the word processing mode. And only RamWorks II features a built-in printer buffer, so you no longer have to wait for your printer to stop before going back to AppleWorks (256K or larger RamWorks II required).

With RamWorks II, you won't have to split your data into 2 or more separate files because you'll have the necessary memory to access ALL your data ALL the time, quickly and conveniently.

RamWorks II	AppleWorks Desktop
128K	101K
256K	188K
512K	378K
1 MEG	758K
1.5 MEG	1136K
3 MEG	2277K

The Most Friendly, Most Expandable Card Available.

RamWorks II is compatible with more off-the-shelf software than any other RAM card. Popular programs like Advanced VisiCalc, Magic Office System, Flashcalc, The Spread Sheet, Diversi-DOS, Supercalc 3A, Magicalc, etc. (and hardware add-ons like Profile and Sider hard disks). Fact is, only RamWorks is 100% compatible with all software written for the Apple 80 column and extended 80 column cards. In addition, RamWorks II can emulate most other RAM cards, so you can use programs written for them without modification. And any size RamWorks II can be user upgraded later to any larger size.

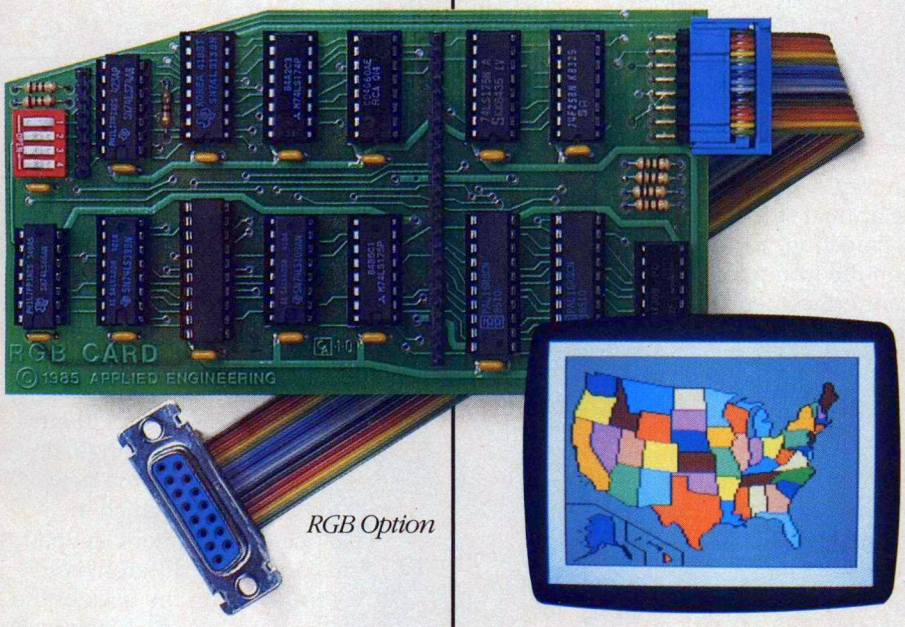
RamWorks II was designed so you could take full advantage of future developments in 16 and 32 bit microprocessors. As your needs grow, so can RamWorks II. A handy coprocessor connector allows the latest and greatest coprocessor cards to access all 3 MEG

of RamWorks II memory. And speaking of more memory, RamWorks II has a memory expansion connector on board so a low profile (no slot 1 interference) memory expansion card can add another 512K or 2 MEG of memory.

Unlike Apple's smaller, more expensive RAM card, RamWorks II plugs into the IIe auxiliary slot and therefore leaves slots 4 and 5 available for other peripheral cards.

It's In Color

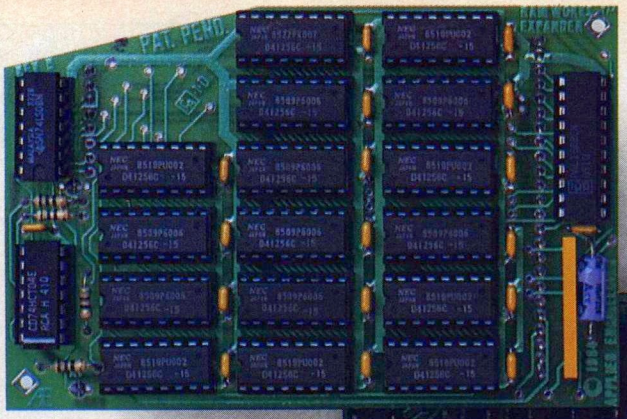
RamWorks II by itself is *fully* compatible with both the Apple monochrome and color monitors. But if you want better color graphics *plus* a more readable 80 column text (that blows away any composite color monitor) you'll appreciate our RGB color option. For only $129, it can be added to RamWorks II, giving you a razor sharp, vivid brilliance that's unsurpassed in the industry. The RGB option does not waste another valuable slot, but rather plugs into the back of RamWorks II with no slot 1 interference (works on the original RamWorks, too) and attaches to virtually any RGB monitor. And remember. You can order the RGB option with your RamWorks II. Or add it on at a later date.



RGB Option

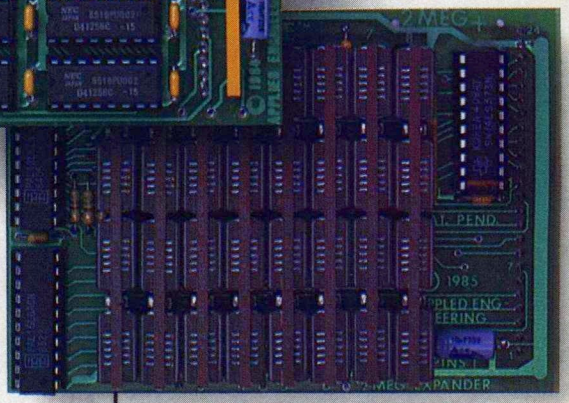
It Corrects Mistakes.

Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by AppleWorks, Advanced Visicalc, Flashcalc, Supercalc 3A, or other programs, and you want RamWorks II.



512K Expander

2 MEG Expander



No problem. The memory chips on the card that you now have, which is where most of the money is, can be unplugged and then plugged into the expansion sockets on RamWorks II.

It's Got It All.

- 15 Day Money Back Guarantee
- Super sharp 80 column text (patent pending) with or without RGB option
- Double high resolution graphics (with or without RGB option)
- Expandable up to 1 Meg (1024K) on main board
- Expandable to 3 Meg (3072K) with expander (piggyback) card
- Can use 64K or 256K RAMS in any combination
- Linear addressing coprocessor port
- Automatic AppleWorks expansion up to 2277K desktop
- Accelerates AppleWorks
- Built-in AppleWorks printer buffer
- The only large RAM card that's 100% compatible with all IIe software
- RamDrive ™ the ultimate disk emulation software included free
- 16 Bit option
- Compatible RGB option
- Built-in self diagnostics software
- No slot 1 interference
- Lowest power consumption (patent pending)
- Takes only one slot (auxiliary)
- Software industry standard
- Advanced Computer Aided Design
- Used by Apple Computer, Steve Wozniak and virtually all software companies
- Displays date and time on the AppleWorks screen with any PRO-DOS compatible clock
- 5 Year no hassle warranty

RamWorks II with 64K	**$ 179**
RamWorks II with 256K	**$ 219**
RamWorks II with 512K	**$ 269**
RamWorks II with 1 MEG	**$ 389**
RamWorks II with 1.5 MEG	**$ 549**
RamWorks II with 3 MEG	**$1699**
RGB Option (may add later)	**$ 129**
16 Bit Option (may add later)	**$ 89**

RamWorks II. The industry standard for memory expansion of the Apple IIe.

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BY FREDERIC E. DAVIS

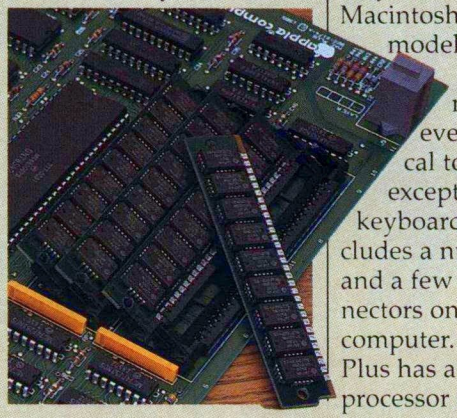
NewsPlus

The standard RAM configuration, the amount of diskette storage, and the amount of ROM all have doubled.

APPLE ANNOUNCES MACINTOSH PLUS

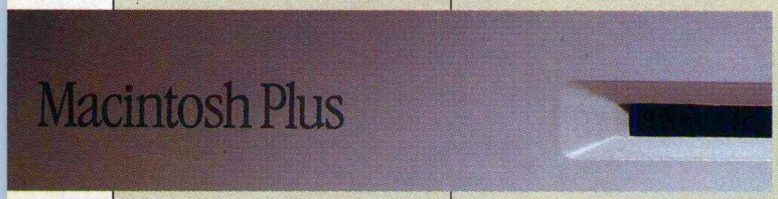
Apple broke with tradition this year and announced the Macintosh Plus in mid-January, a week before the annual stockholders' meeting, which had been the forum for Apple announcements in previous years. Apple decided that it was better to make announcements more unpredictably and to free the stockholders' meeting from the pomp and circumstance that surrounds new-product introductions.

A+ was invited to Apple to preview the Macintosh Plus, but the company was not willing to let us have a machine to test at that time. Since we were not able to get our hands on the genuine item, we decided to hold off on a feature article until we had more time to investigate Apple's newest computer. Last month, Steve Rosenthal discussed the possibility of a SCSI interface for the Mac in his "Thoughtware" column (*A+*, February 1986, pages 157–160), and in this month's "Thoughtware" column, Rosenthal talks about the upgrade dilemma. I will give you the rundown on the new Macintosh Plus here in this month's NewsPlus, and next month we'll follow up our preliminary coverage with more detailed information in a feature story on Apple's new top-of-the-line computer.



THE NEW MACINTOSH PLUS SPECS

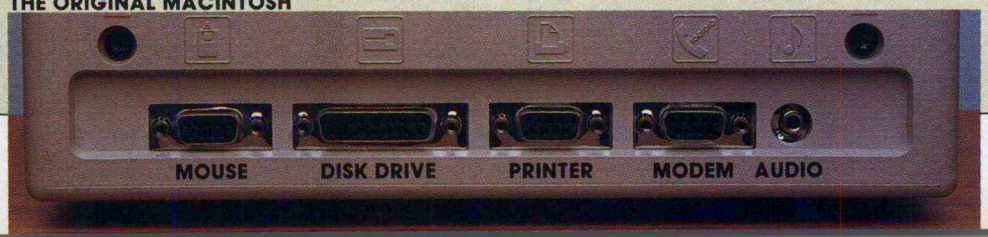
The Macintosh Plus is very similar to the original Macintosh 128K and 512K models in many respects. The new machine even looks identical to the original, except for the new keyboard, which includes a numeric keypad, and a few different connectors on the back of the computer. The Macintosh Plus has a 68000 microprocessor whose speed is



The Mac Plus comes with faster, double-capacity drives, new ROMs, and a new keyboard with a built-in numeric keypad and cursor keys. The motherboard features four slots for plugging in memory modules, as well as a high-speed SCSI peripheral interface.

THE MACINTOSH PLUS

THE ORIGINAL MACINTOSH



Six companies have already announced SCSI-compatible storage devices.

the same as that of the older models. It also has the same nine-inch-diagonal, 512 × 342-pixel, bit-mapped, monochrome display; the same sound generator; and the same mouse.

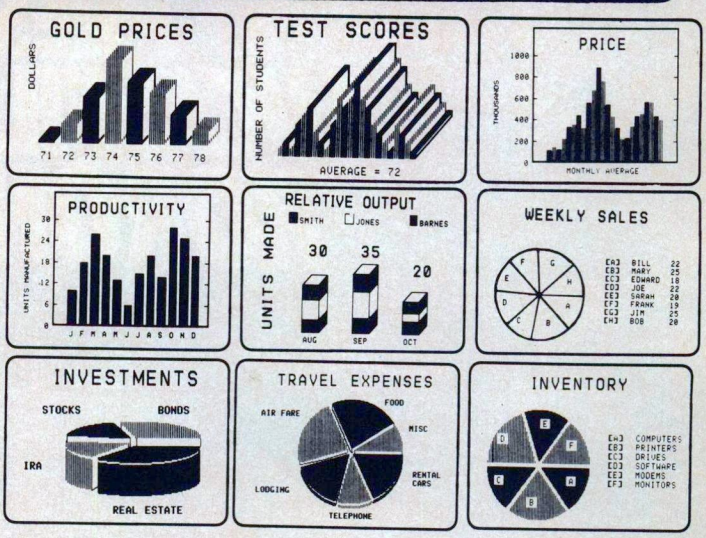
The new features of the Macintosh Plus are quite significant, however. First, the standard RAM configuration has been doubled from 512K to 1 megabyte, the amount of diskette storage has doubled from a single-sided 400K disk drive to a double-sided 800K drive, and the amount of ROM has also doubled to 128K.

The new ROM contains additional instructions for the Mac, such as information about how to operate the new double-sided drives and boot from external hard disks, as well as some improvements on old instructions, such as a faster version of the QuickDraw graphics routines. Another change is the addition of a small icon called a grow box that enlarges the window to full-screen size. The grow box is on the left side of the title bar that appears at the top of each window, and you activate it by clicking the mouse while pointing at it. One of the most significant features of the new ROM is disk-caching software, which improves the Mac's speed by temporarily storing information from a disk or other storage device in RAM for faster access.

The Macintosh Plus has a new System file and a new Finder, Version 5.1. The new Finder works in the same way as Finder 5.0 does (see *A+*, February 1986, pages 130–131) but clears up some of the incompatibility problems found in Version 5.0. The new system uses the hierarchical file structure and features two new versions of existing desk accessories: the new Control Panel includes a way to set disk-cache parameters, and the Choose Printer desk accessory has been replaced by the Chooser, which allows you to choose among serial ports and the new SCSI port.

One of the most important features of the Macintosh Plus is the new high-speed SCSI (which stands for Small Computer Systems Interface and is commonly pronounced "scuzzy") interface port. The SCSI connector allows a wide variety of industry-standard storage devices such as hard disks and tape drives to be hooked up directly to the Macintosh, bypassing the tediously slow serial ports that first-generation Macintosh hard-disk drives were plugged into. Seven companies, including AST Research of Irvine, California; LoDOWN of Pleasanton, California; M.D.I. of Foster City, California; 3Com of Mountain View, California; Sunol of Pleasanton, California; Iomega of Roy, Utah; and Super-

AlphaChart!



CHARTS! Don't pay more for less! The pictures shown above are examples of charts created with **AlphaChart!**, perhaps the most powerful and friendly Apple II chart program on the market. Within seconds, keyboard-entered data can be converted into picture-perfect pie or bar charts, in 26 user-selectable styles, automatically scaled and labelled, and in color or black and white. And **AlphaChart!** prints on most dot matrix printers. If you want to customize your charts by adding extra artwork or text, or display them in a slide show, **AlphaChart!** comes with these valuable extras. . . . .

SLIDE PROJECTOR for orchestrating automated, stand-alone screen presentations of a series of charts, timed and sequenced by the user. This program alone is worth the cost of the disk. It can be used with any graphics files created with any program.

GRAPHICS EDITOR for alteration and embellishment of charts. Besides standard point-by-point sketching, built-in structures permit push-button creation of circles, rectangles, lines, shape-table shapes, and exotic woven plaid patterns. If you wish to add clarifying text to the charts, you may type on the screen in several different letter font styles. For the artist, the graphics editor can also be used to sketch any imaginable scene from scratch.

SHAPE TABLE EDITOR for creating special shapes for your charts. These shapes can also be used for animation in your programs! A sample animation program shows how to do it.

"The software does much more than the advertisement suggests. Without question, this is among the best buys if software that I have ever come across, and certainly among the best written. It is extraordinarily easy to use, very well thought out, and priced to kill your competition (which I wish you every success in doing)." **Anthony J. Scriffignano, North Caldwell, New Jersey.**

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CIRCLE 109 ON READER SERVICE CARD

EPYX PRESENTS LUCASFILM GAMES.™ KORONIS RIFT™

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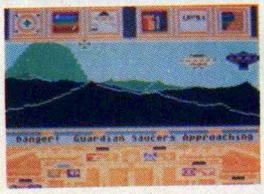

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It takes all kinds to make a galaxy interesting. Like you, a *techno-scavenger.* Your kind are out to get rich scavenging Ancient technology. And now you've found the fabled Koronis Rift—the weapons testing grounds of the Ancients. The chance of a lifetime awaits you.

Abandoned war hulks litter the Rift—crammed with exotic weapons and technology. The lifelike fractal graphics take you to this mythical land of the Ancients. The mind's-eye point of view puts you right in the driver's seat of a Surface Rover. A hulk looms before you—your mind races, feverishly planning a strategy. What weapons do you need to survive? What technology will fetch the highest price? If you can pack your battered Rover full—you'll be rich beyond your wildest dreams.

But it won't be easy. The Guardians—genetically engineered mutants—stand watch over their creators' technology. And they deal swiftly and ruthlessly with characters like techno-scavengers.

But you've got a plan. If you and your trusty Science Droid can scavenge the right combination of weapons and technology—and get off the planet alive—you'll make it big. Destroy the Guardian base and you'll even be a hero! The treasures of the Ancients are yours . . . if you've got what it takes.

	C64/128	ATARI	APPLE
Koronis Rift	✓	✓	✓

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CIRCLE 285 ON READER SERVICE CARD

NewsPlus

The Macintosh Plus uses four single in-line memory modules.

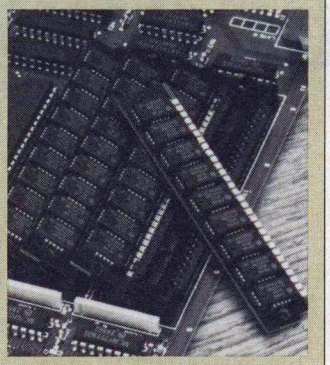
Mac of Mountain View, California, have already announced SCSI-compatible storage devices for the Macintosh Plus.

The Macintosh Plus SCSI interface is controlled by a standard NCR 5380 SCSI controller chip. Manufacturers and designers of peripherals who wish to develop SCSI-compatible products should also check out the NCR 5385 controller chip, a more intelligent version of the NCR 5380. The Macintosh Plus NCR 5380 SCSI controller chip is capable of transmitting data at rates of up to 1.5 million bits per second, according to the manufacturer. Apple claims that the port can transfer data at a rate of 320K bytes per second. Certainly this port has the capability of greatly improving the overall performance of the Mac, since slow peripheral I/O was one of the original Mac's biggest problems.

SIMM

The Macintosh Plus RAM is attached to the motherboard in a new way. The Macintosh Plus uses four single in-line memory modules (known as SIMMs) that each contains 256-Kbytes of memory, using 256-Kbit RAM chips. When 1-megabit RAM chips become available later this year, new SIMMs that each hold 1 megabyte will allow easy upgrading of the Macintosh Plus to 4 megabytes of RAM.

The four SIMMs that we saw in a Macintosh Plus were made by Texas Instruments and are a

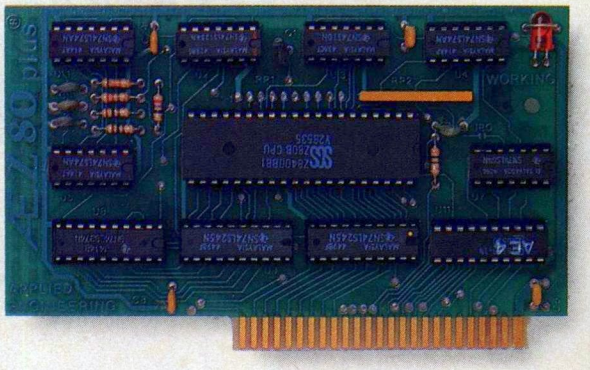


standard design manufactured by other vendors as well. The SIMMs plug into the motherboard at an angle and can easily be replaced to increase the Mac's memory. The plug-in design will also allow third-party developers to create RAM-expansion products for the Macintosh that will not require modification or soldering of the motherboard. In fact, John Foley of MacMemory Electronics says his firm is already working on SIMM-compatible memory upgrades for the Macintosh Plus.

UPGRADE

Now, what is it going to cost current Mac owners to upgrade their machines? The upgrade is available in three separate components: (1) the Macintosh Plus Disk Drive Kit,

With Z-80 Plus,™ run CP/M®–the largest body of software in existence.



Now, get two computers in one, and all the advantages of both.

Enter the CP/M world with the new Z-80 Plus card from Applied Engineering, and introduce your Apple IIe® or II+ ® to the thousands of CP/M programs. Only the Z-80 Plus comes standard with the new 4.0 software, the most advanced system ever for running CP/M programs.

The new 4.0 boasts advanced features like built-in disk emulation for popular memory expansion boards, boosting both system speed and storage capacity. And menu-driven utilities that let you get to work faster. The Z-80 Plus also lets you run older CP/M programs — all the way down to Version 1.6 (2.2 is the most popular).

The Z-80 Plus is the only card on the market capable of accessing more than 64K in an Apple IIe. If you have an extended 80-column card, all 128K is usable, and if you have RamWorks, up to 1088K is available.

Each Z-80 Plus comes with our CP/M Ram Drive software, enabling IIe owners to use an extended 80-column card or a RamWorks card as a high-speed Ram disk which runs CP/M software up to *twenty times faster.* So packages like WordStar and dBASE II run at blinding speed.

Simply plug the Z-80 Plus into any slot in your Apple. You'll get the benefits of two computers in one — all at an unbelievably low price (only $139!).

• Fully compatible with ALL CP/M software • Fully compatible with most hard disks, including Corvus and the Sider • Fully compatible with Microsoft disks (no pre-boot required) • Specifically designed for high speed operation in the Apple IIe (runs just as fast in the Apple II+ and Franklin) • Runs WordStar, dBASE II, Turbo Pascal, Fortran-80, Peachtree and ALL other CP/M software with *no pre-boot* • Semi-custom I.C. and low parts count allows Z-80 Plus to fly through CP/M programs with extremely low power consumption (we use the Z-80B) • Does EVERYTHING other Z-80 boards do, *plus* Z-80 interrupts • Five year warranty

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WordPerfect word processing software is designed to get the highest possible performance from your Apple. The same functions and features that have made WordPerfect one of the best-selling word processors for PCs, make it the perfect word processor for your Apple.

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WordPerfect is easy to use. Most functions require just one or two keystrokes. And on-line help screens and a step-by-step manual make learning a breeze.

With WordPerfect, what you see is what you get. On-screen formatting ends the guesswork, so there are no format surprises when you print your document.

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Even the most demanding word processing functions are handled smoothly and thoroughly by WordPerfect. Like footnotes, concurrent printing and editing, macros, redefining of headers and footers, and an optional 50,000-word spelling dictionary. Functions not found on many word processors. Functions which allow WordPerfect to squeeze more juice than ever before out of your Apple.

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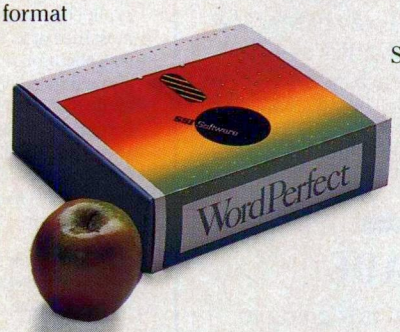
With all it has to offer, WordPerfect for the Apple IIe and IIc sells for only $179. Add just $30 for the spelling dictionary. It's a small price to pay for perfection.

For a demonstration or more information, see your Apple dealer. Or write or call:



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CIRCLE 222 ON READER SERVICE CARD

NewsPlus

What is it going to cost current Mac owners to upgrade their machines?

which includes the new 128K ROMs and a replacement 800K drive; (2) the Macintosh Plus Logic Board Kit, which consists of a new motherboard with one megabyte of RAM and SCSI and includes a new rear housing for the Mac case that makes room for the new 25-pin SCSI connector; and (3) the Macintosh Plus Keyboard, which features a numeric keypad and cursor keys.

The Macintosh Plus Disk Drive Kit with 800K drives and the new ROMs retails for $299 and must be installed by your dealer. This upgrade is the one that most people will want, and it is priced very reasonably. The only disadvantage of this part of the upgrade is that you cannot upgrade your external disk drive; Apple wants you to buy one of the new external 800K half-height drives, which retails for $499.

The Macintosh Plus Logic Board Kit will retail for $599 if you have a Macintosh 512K or a 128K Mac that was upgraded to 512K by Apple. The Macintosh Plus Logic Board Kit will sell for $799 if you have a 128K Mac or a non-Apple memory upgrade. This differential in pricing is meant to reward those people who paid the extra money for Apple's 512K memory upgrade. The Macintosh Plus Logic Board Kit is available only in tandem with the Macintosh Plus Disk Drive Kit and must be installed by an Apple dealer. If you want SCSI, you will need to buy this upgrade, but if you don't need SCSI, you may want to wait a while.

The Macintosh Plus Keyboard is priced at $129, which is only slightly more than the $99 price tag on the current separate numeric keypad. The Macintosh Plus Keyboard is only about two inches longer than the current Mac keyboard, so it should fit in many of the current Mac carrying cases. The new keyboard is necessary only if you want to use the numeric keypad or cursor keys. The cursor keys are useful only in application software such as a word-processing or spreadsheet program; you cannot use the cursor keys to navigate the pointer on the desktop. *(Note: Prices not final at press time.)*

LASERWRITER PLUS

Apple announced an upgrade to the LaserWriter called the LaserWriter Plus at the same time as it announced the Macintosh Plus. The LaserWriter Plus is identical to the LaserWriter, except that the ROM has been doubled from 512K to 1 megabyte and that the printer can now work with the 128K Macintosh, can download typefaces from a computer

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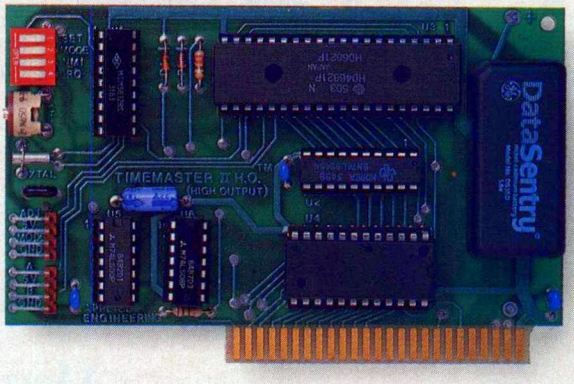

Now, get all the features of all the competition combined!

It's the smart way to put the time and date on your Apple II+® or IIe®. Because only the Timemaster H.O. packs *ALL* the features of all the competition *combined,* including leap year, year (not just in PRO-DOS), month, date, day of week, hours, minutes, seconds and milliseconds. It's totally PRO-DOS, DOS 3.3, PASCAL and CP/M compatible. And of course, it works better than any other clock with AppleWorks.

If you're using or writing software for other clock cards, you're still covered. Because the H.O. will *automatically* emulate them. And the Timemaster H.O. adds 14 new commands to BASIC. The H.O. even comes complete with two disks full of sample programs, including a computerized appointment book, a DOS dating program, interrupt programs, and over 30 programs that others charge extra for — or don't even offer.

As a low-cost option, you can add true BSR remote control to the H.O., giving you remote control of up to 16 lights and appliances in your home or office.

• Fully PRO-DOS and DOS 3.3, CP/M and PASCAL compatible • Time in hours, minutes, seconds and milliseconds (the ONLY PRO-DOS compatible card with millisecond capability); date with year, month, day of week and leap year • 24-Hour military format or 12-hour AM/PM format • Eight software controlled interrupts so you can run two programs at the same time (many examples included) • Can be set to the second • Allows AppleWorks to time and date stamp all data automatically • The only clock card that displays time and date on the AppleWorks screen • Five-year warranty

Clock price **$129.00**
BSR option (may be added later) ..... **$ 49.00**

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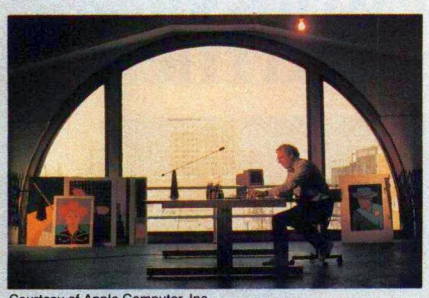

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CIRCLE 373 ON READER SERVICE CARD

NewsPlus

SCSI would be ideal for a high-speed implementation of AppleTalk.

(for a list of the downloadable typefaces available from Adobe, see last month's "NewsPlus"), and has seven additional built-in typefaces: Avant Garde Gothic, Bookman, Helvetica Narrow, New Century Schoolbook, Palatino, Zapf Chancery, and Zapf Dingbats. The original LaserWriter retails for $5999, the LaserWriter Plus costs $6798, and a kit to upgrade your LaserWriter to a LaserWriter Plus is $799.

SCSI FOR APPLETALK

Although Apple has not announced any plans along these lines, the high-speed transfer rate would make SCSI ideal for a high-speed implementation of AppleTalk. A combination of SCSI and AppleTalk could be especially useful for applications in which large amounts of data are contained in fileservers that several computers share.

MOUSEDESK GIVEAWAY

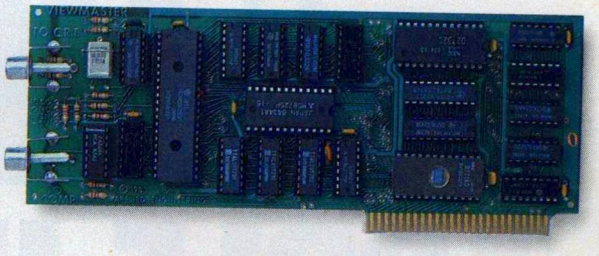
Catalyst 3.0 and MouseDesk are both desktop organizers and program selectors that recreate the Macintosh-desktop metaphor on the 128K Apple IIe and Apple IIc. Both of these programs herald the new look of the Apple II; new Apple II software will take increasing advantage of the Macintosh user interface, with its pull-down menus, windows, dialog boxes, and mouse. Because of the significance of this new technology, the two programs are compared in this month's cover story, "Catalyst 3.0 and MouseDesk."

Catalyst 3.0 from Quark had an initial advantage over International Solutions' MouseDesk because Apple decided to include a copy of Catalyst with every Apple UniDisk 3.5. Bill Cleary, director of marketing at International Solutions, tells me his company is going to retaliate by giving MouseDesk away from now until March 31, 1986, for a $10 materials, handling, and shipping charge. To take advantage of this offer, write to MouseDesk Offer, International Solutions, P.O. Box 3541, Saratoga, CA 95070-1541, or call (408) 773-0443. Tell them *A+* sent you.

CALLING ALL USERS' GROUPS

Apple is trying to round up information about all the Apple-related users' groups. If your group hasn't already heard from Ellen Leanse, the new Apple User Group Evangelist, write to her about your group at Apple Computer, Inc., MS 23G, 20525 Mariani Avenue, Cupertino, CA 95014.

Viewmaster 80,™ the sharpest 80 column card of them all.



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VIEWMASTER 80	✓	✓	✓	✓	✓	✓	✓	✓	
SUPRTERM		✓					✓	✓	
WIZARD 80					✓		✓	✓	
VISION 80	✓	✓			✓				
OMNIVISION		✓					✓	✓	
VIEWMAX 80	✓	✓			✓			✓	
SMARTERM	✓	✓				✓	✓		
VIDEOTERM		✓	✓		✓	✓		✓	

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One look at the chart will give you some of the reasons there's only one smart choice in 80 column cards for your Apple. But the real secret to Viewmaster 80's success is something even better: Total compatibility.

The Viewmaster 80 works with all 80 column applications, including DOS 3.3, PRO-DOS, CP/M, Pascal, WordStar, Format II, Easywriter, Applewriter II, Supertext 80, Zardax, Apple PI, Letter Perfect, dBASE II, Visicalc, Multiplan, and *hundreds* of others.

And the Viewmaster 80 delivers a super sharp, state-of-the-art display with a 7×9 character matrix for clear, easily readable characters. Here are just a few of the powerful features the Viewmaster 80 delivers for a great price ($139):

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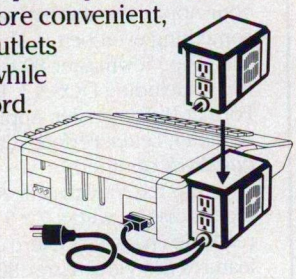
MORE THAN ¼ MILLION APPLE II's SAVED

SYSTEM SAVER® from Kensington Microware quietly protects more than 1/4 million Apple® II's every day. Often referred to as "the piece Apple forgot," System Saver's unique combination of features have made it the most versatile, most convenient, best selling accessory ever made for the Apple.

System Saver organizes your power needs.

To make your Apple system more convenient, System Saver provides extra outlets for your monitor and printer, while replacing the Apple's power cord. One front-mounted power switch controls your whole system.



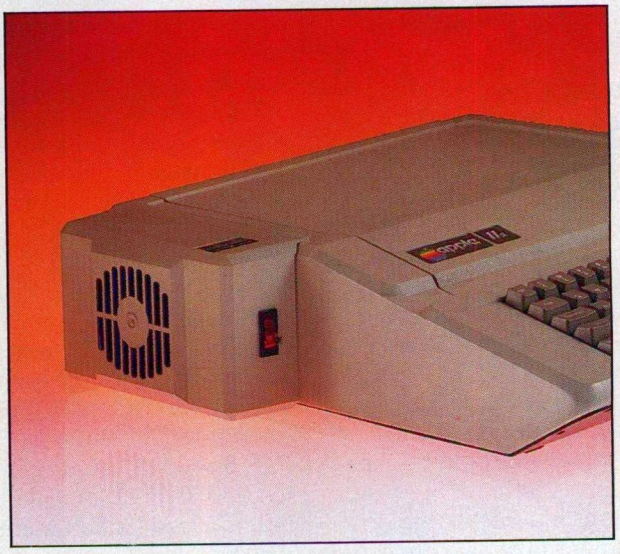
System Saver solves power line problems.

Impurities in the power supply cause 70-90% of all microcomputer malfunctions. Line noise can be interpreted as data, confusing your Apple and causing annoying system errors. Power surges and spikes can do costly damage to your computer's delicate circuitry.

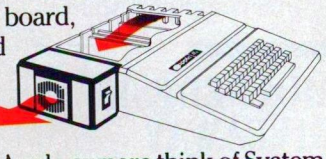
System Saver clips surges and spikes at a safe level and filters out line noise. It makes your Apple more accurate, more efficient and more reliable.

System Saver keeps your Apple cool.

Peripheral cards added to your Apple not only generate heat, they block any natural air flow through the computer. The resulting high temperature conditions can potentially shorten the lives of both your Apple and your peripheral cards.



System Saver's quiet fan draws a breath of fresh air across the Apple's mother board, over the power supply and out the side ventilation slots at the rate of 17 cubic feet per minute.



More than 1/4 million Apple owners think of System Saver as the piece Apple forgot. And 1/4 million well-protected Apples agree. Available at your local dealer. For more information, contact Kensington Microware, 251 Park Avenue South, NY, NY 10010, (212) 475-5200 Telex: 467383 KML NY.

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CIRCLE 134 ON READER SERVICE CARD

NewsPlus

We thought it would be fun to have an official A+ Easter Egg Hunt.

HYPERDRIVE 2000

When Apple announced a scuzzy way to hook up high-speed hard disks to the Macintosh Plus, it looked like hard knocks for the Hyperdrive people at General Computer. But now they have really lived up to the claim that they are hyperdriven, with the announcement of the Hyperdrive 2000 Mac speed-up.

The Hyperdrive 2000 consists of a Hyperdrive 20 hard disk plus a 50%-faster 68000 microprocessor that runs at 12 MHz, and a 68881 floating-point coprocessor that speeds up number crunching as much as 800%. The only catch is that the program must follow Apple's SANE numeric-processing specifications to take advantage of the 68881. The speed increases of the Hyperdrive 2000 are dramatic, however, and let the Mac do certain tasks as fast as much more costly minicomputers. For more information, contact General Computer Company, 215 First Street, Cambridge, MA 02142; (617) 492-5500.

EASTER-EGG HUNT

Creative programmers often embed a secret message inside a program, and often an unusual command will cause the message to appear. These messages are referred to as Easter eggs in programmers' jargon. Here's how to find a few Easter eggs we know of in Mac software: (1) While using Switcher, select About Switcher from the desk-accessory menu and then immediately hold down the question-mark key. You should then see a No thanks to . . . message in the lower right-hand area of the About Switcher window. (2) With the original Macintosh ROMs, call the hexadecimal location 40AD26 (or in BASIC 4238630). Your Mac will freeze up on you, and a message will appear in the upper right corner of the screen that can be useful in detecting illegal clones of the Mac's ROM. (3) If you have a Hyperdrive, try selecting Drawers from the desk-accessory menu three times in rapid succession, and you'll see a picture of Hyperdrive software sharpie Mr. Brown.

Since these tricks can be entertaining, we thought it would be fun to have an official *A+* Easter Egg Hunt. If you know of any surprise messages hidden in an Apple II or Mac program, send them to *A+* Easter Egg Hunt, Attn: Fred Davis, 11 Davis Drive, Belmont, CA 94002. I'll compile the best Easter eggs and give credit to the first people to send them in. +

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All your work is *automatically* time and date stamped to give you a complete record of your work history. And since it's from Applied Engineering, you'll get our famous no-hassle five year warranty and a price that will persuade you.

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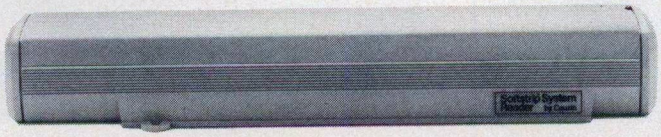

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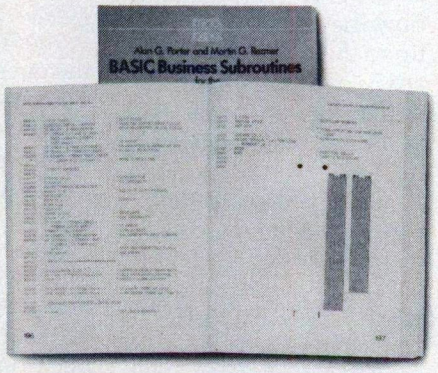

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MARQUEE de SCREEN

Are you tired of the same olds screens staring you in the face all the time? The data strips on the right contain a program called SCREEN SPINNER by Steven Kearns which might well be the answer to your problem. The program is designed to eliminate those 'same old screen blues.'

SCREEN SPINNER is designed to take any string of alphanumeric characters and spin it around the perimeter of the screen in continuous motion in either clock or counterclockwise direction. You control the speed of the spin. Leave a message in a stationary position, or spin it at unreadable blinding speed. The choice is up to you.

Your message may be any length up to 255 characters. You can make it flash, inverse, or even mix-up the modes if you like. How about personalizing your program. Just sign your name and let people know who the genius behind the screen is.

There are two files on these strips. SPINNER is the main program and a machine language utility. It is compatible with either DOS 3.3 or ProDOS. SPINNER.DEMO1 is written in Applesoft BASIC and demonstrates how to use SPINNER.

After you read in the data strips, you can run the program from the Cauzin menu, or enter RUN SPINNER.DEMO1. Press the SPACE BAR to go from screen to screen. Exit any time by pressing CONTROL-RESET.

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SCREEN SPINNER is reprinted from *Nibble* Magazine, March 1985, p.82

LEARN MORE ABOUT YOUR FUTURE

Do you ever wake up in the morning wondering what the day will bring? Is it a good day to go golfing, or is this the day to tackle that report you've been putting off. Let's face it, some days you feel like doing certain things and other days dynamite couldn't inspire you.

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The data strips on the right contain a program called COMPOSITE BIORHYTHMS by Lee Banks, which appeared in NIBBLE Magazine, November 1984, page 69. Knowing when your critical days are will give you an edge and help you to prepare to be your best.

After you read in the data strips, you can either RUN the program from the Cauzin communications menu or you can enter RUN COMP.BIO. This program will work with either DOS 3.3 or ProDOS. From the menu you can display your current position in biorhythm cycles for today, or display a composite chart for an overview of the month. Quit anytime by choosing EXIT from the main menu or by pressing CONTROL-RESET.

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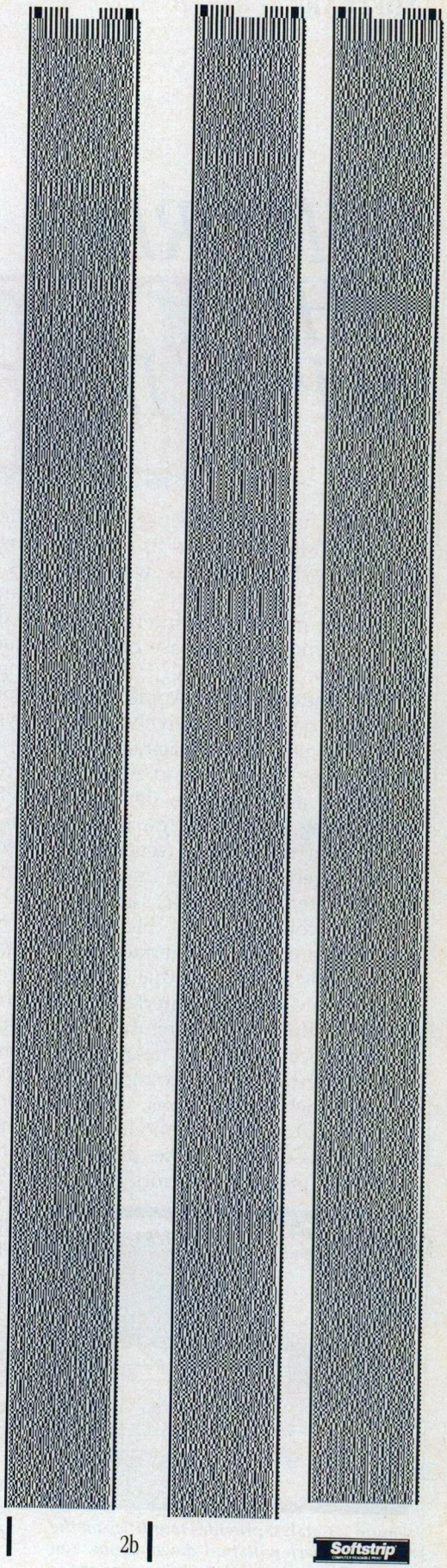

EXPLORING THE APPLE II DESKTOP

Two years have passed since the debut of the Macintosh and its desktop interface, which features windows; pull-down menus; icons; and, of course, the mouse. This interface has become famous for its ease of learning and use.

Not unexpectedly, Apple Computer, Inc. has started actively to promote the use of a Macintosh-like interface for Apple IIe and Apple IIc programs, and software developers are listening. In the past few months, we've seen the birth of several fine mouse-based programs such as MouseWrite, MouseCalc, and the firmware for the Street Electronics BusinessCard printer-interface card. The success of these products means that the Macintosh interface will probably show up in many more Apple II applications in the near future.

In this article, we're going to look at two such applications, Quark's Catalyst 3.0 and International Solutions' MouseDesk. These programs are called program selectors because their main function is to make selecting programs to run, delete, and copy as easy as possible. Another important function is to display the files on a disk. With these programs, you request file and disk operations by using mouse techniques similar to those you use with the Macintosh operating system, the Finder.

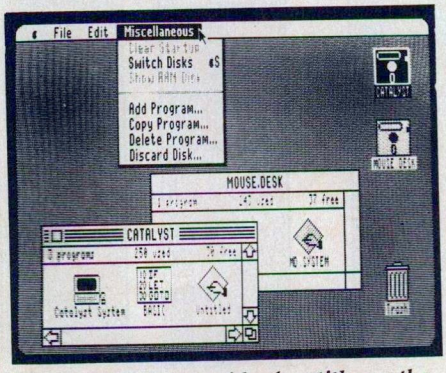

Figure 1: Catalyst provides four titles on the menu bar, each with pull-down menus. You can initiate some commands by using the special solid-apple key. The desktop usually displays icons only for executable programs.

Catalyst and MouseDesk were both announced last September when Apple released the UniDisk 3.5 disk drive; Catalyst comes with every UniDisk 3.5 sold in the United States, and MouseDesk is bundled with the UniDisk outside the United States. The programs are also available on standard 5¼-inch floppy disks.

Since Catalyst and MouseDesk create their desktop images on the double-width high-resolution-graphics screen, you'll need a 128K Apple IIe or IIc to run them. Catalyst has one further requirement if you're using a IIe: You must be using the new enhanced ROMs (see the August 1985 issue of *A+* for my analysis of these ROMs, "A Close Look at Recent IIe Enhancements," pages 45–54). The reason is that the Catalyst program uses instructions that are unique to the 65C02 processor that is part of the ROM-enhancement package. Why Quark chose not to make Catalyst available to the thousands of users who have not yet switched from the original 6502 processor is a mystery, especially since the program would likely not have been much larger if it had been written with 6502 instructions only.

You should also have a mouse if you want to use Catalyst or MouseDesk, although both programs can work without one. You simply can't do things as easily with the equivalent keyboard commands.

When you first start up Catalyst or MouseDesk, a desktop quite similar to the Macintosh's appears (see figures 1 and 2). At the top of the screen is a menu bar that contains the titles

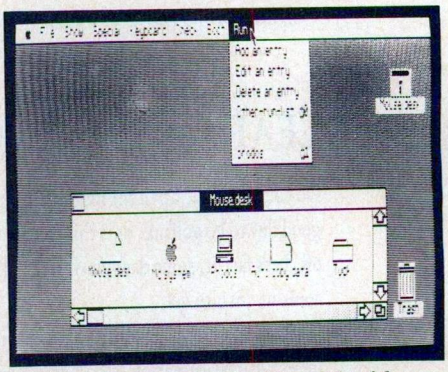

Figure 2: MouseDesk provides eight titles on the menu bar, each with pull-down menus. You can initiate some commands by using the special open-apple key. The desktop contains one icon for each file on the disk, and the icon shape depends on the file type.

for four (Catalyst) or eight (MouseDesk) pull-down menus. To display the commands (or "items") in these menus, you move the mouse pointer to the title you want and press the mouse button. To select an item, you move the mouse pointer down the list that appears until the item is highlighted, and then you release the button. This selection method is identical to the Macintosh's.

On the right side of the screen are icons for the disks that are "mounted" in any of the ProDOS-compatible disk drives in the system. Unique icons represent the ProFile hard disk, UniDisk 3.5-inch disk, Disk II 5¼-

Catalyst 3.0 and MouseDesk bring the Mac-like desktop environment to the Apple IIe and IIc.

inch disk, and Apple's recently released one-megabyte Apple II Memory Expansion Card. Catalyst also has a unique icon for the Quark QC10 and QC20 hard disks.

In the lower right corner is an icon for a trash can that serves as a destination point for file deletion and disk-removal operations.

Cataloging the Disk

To see what's on a disk, all you have to do is position the mouse pointer over the disk's icon and quickly press the mouse button twice (this technique is called double-clicking), which makes a window open up that contains icons for the programs

on the disk (see figures 1 and 2). You can also configure MouseDesk to display files by name, data, size, or type, instead of by icon (see figure 3). In order to resize or scroll the window to reveal all the icons it contains, you use the mouse, just as you would on a Macintosh.

With MouseDesk, the disk window holds one icon for each file on

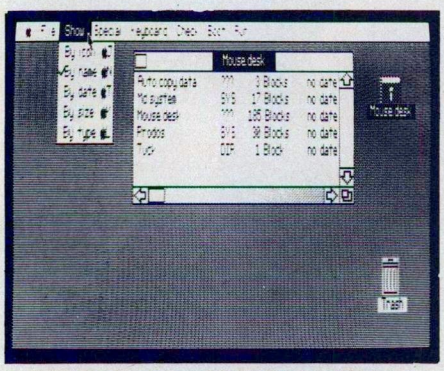

Figure 3: You can configure MouseDesk to display files in various ways by selecting your choice from the Show menu.

the disk, and the filename appears below the icon. The shape of the icon depends on the file type; for example, an Applesoft program is represented by a rectangular flowchart image, and a binary program is represented by a diamond containing the binary number 01. ProDOS subdirectories are represented by icons that look like little file folders. To see what's in a subdirectory, you double-click on its file folder, and a window for it opens up to reveal more file icons.

Catalyst, on the other hand, does not use this one-file/one-icon approach. In fact, if the disk contains only programs you've written yourself, the only icon that will appear in the window represents the first system file that has a name ending in .SYSTEM. It is the program that ProDOS automatically runs when you boot the disk; in most cases, the program is BASIC.SYSTEM, the ProDOS Applesoft interpreter.

You can, however, add icons for your own programs (Quark calls them custom programs) to the window by using the mouse to pull down the Miscellaneous menu and selecting the Add Program command. Then you enter the program title (the name that appears beneath the icon, which is not necessarily the filename), the name of the system file to run before running the program (if you're adding an Applesoft program, it will be BASIC.SYSTEM), the name of the subdirectory in which the program resides, and the name of the program to be passed to the System program.

Manually installing programs is inconvenient, but there's a good reason for it: The Catalyst philosophy is to display icons only for files that represent executable programs and, generally, it can't tell in advance what those files will be. Catalyst does not want the screen cluttered up with icons for files that aren't programs, because users rarely need to be aware of them.

If the disk in the drive holds a commercial program, it may also hold CATALYSTDESKTOP, a special desktop file that Catalyst reads to determine what icons to place in the disk window on the desktop. In a typical case, an icon represents a group of disk files, not just a single file, so it's roughly equivalent to a ProDOS subdirectory. Several commercial programs are already available with Catalyst desktop files, and more will follow as Catalyst gets into the hands of more and more users.

The ability to assign a group of files to a single icon compensates for Catalyst's failure to display subdirectory icons as MouseDesk does. Unfortunately, Quark provides details of how to create desktop files only to approved software developers—you can't create them with the standard version of Catalyst.

Running Programs

To run a program, you simply double-click on its icon. This step is easy enough with Catalyst, because every icon is associated with an executable program (or should be). I did run into one compatibility problem, however: My Merlin Pro assembler program ran fine but would not return to Catalyst as it should have. I suspect that the problem resulted from a conflict in auxiliary-memory usage. Another minor problem was that I couldn't manually install and run MousePaint without having to run BASIC.SYSTEM first. I'm still not sure what caused that problem, but at least it was easily surmountable.

With MouseDesk you have to be more careful, because an icon may represent a data file that you can't run. The icons that represent programs are the apple icon (stands for a system program whose name ends in .SYSTEM), the computer icon (designates any other system program), and the flowchart icon (denotes an Applesoft program). The diamond icon (a binary file) may or may not represent a program; if you select it, MouseDesk will ask you to verify the selection. You can simplify the procedure for running a program by creating a Run list with the commands in MouseDesk's Run menu. The main Run list contains the names of up to eight files that you can run by selecting their names from the menu rather than having to double-click on icons. By installing files in the Run list, you can avoid hunting through subdirectories to uncover the file on which you want to double-click (figure 4).

MouseDesk has two annoying traits, however, that make running programs from the desktop or from the Run list awkward or impossible.

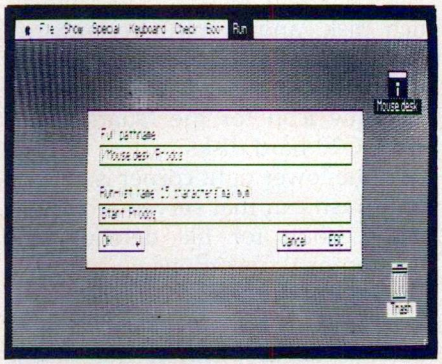

Figure 4: Typing the above information allows MouseDesk to add your program name to the Run menu. You can start your program either by selecting the name from the menu or by pressing open-apple and the number corresponding to its position in the menu.

First, if you select an Applesoft program, the program won't run if a copy of the BASIC.SYSTEM interpreter is not located in the same subdirectory as the program itself. If you're like me, you probably retain a copy of BASIC.SYSTEM only in the volume directory—to avoid unnecessary duplication. If so, you can't run an Applesoft program until you've copied BASIC.SYSTEM into each subdirectory. A more convenient approach would have been for MouseDesk to search the volume directory for a copy of BASIC.SYSTEM if it didn't find it in the subdirectory.

Second, you can't run certain binary programs designed to operate in a BASIC.SYSTEM environment. For example, I have several programs that add custom commands to BASIC.SYSTEM. I can't run these with MouseDesk because there is no way to tell MouseDesk that BASIC.SYSTEM must be loaded first.

One reason for using MouseDesk or Catalyst is to simplify the copying of files from a floppy disk to a high-capacity disk.

In comparison, Catalyst lets you specify the name of a system program to run before the selected program runs, so you avoid the MouseDesk problem of not being able to run binary programs that require the presence of BASIC.SYSTEM. MouseDesk has no problem running binary system programs (they have the file-type mnemonic SYS when you do a standard CATALOG listing of the disk) such as AppleWorks, Apple Writer, Filer, and MousePaint, because they are stand-alone applications that do not require BASIC.SYSTEM.

Copying Programs

One reason for using MouseDesk or Catalyst is in order to simplify the copying of files from a floppy disk to a high-capacity disk such as the ProFile or the 800K UniDisk. With MouseDesk you copy files by highlighting the file's icon (by clicking on it) and then dragging it (by moving the mouse with the button still down) into the window for the destination disk or on top of the disk icon itself. You can also copy several icons at the same time by extending a selection—you hold down the open-apple key while clicking on other icons, or you click in the white space of an open window, drag a rectangle around the group of files to be selected, and then drag the selected group as a whole. You can copy an entire subdirectory simply by selecting and dragging its file-folder icon.

Copying with Catalyst is more limited because you can copy only one icon at a time and also because you must drag the icon into the open window for a disk, not on top of the disk icon itself. The first limitation is really not that serious because, as we have seen, one icon can represent a group of files on the disk. In fact, it may even be an advantage because, if the icon is for a commercial program (that is, one that has its own desktop file), all files that must accompany the main application will be copied automatically—you're not in danger of

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forgetting anything. With MouseDesk you can never be sure that you have copied everything, because there is no way of associating related files (other than by placing them in the same subdirectory).

Some problems arise when you use Catalyst to copy a custom program, because the icon for such a program represents only the main program file, and not any subsidiary files. To copy any associated subsidiary files, you will probably have to resort to using the Filer program on the ProDOS users' disk, and this extra step defeats the purpose of using a desktop program in the first place. The alternative is to create icons for each subsidiary file, but this approach goes against the Catalyst credo that each icon shall represent an executable program. The ideal solution to this problem would be for Quark to release information on how to create desktop files to everyone, not just to developers. I've discussed this possibility with Quark, and the company is considering it.

Copying Disks

Catalyst comes with a marvelous mouse-based program called Quick Copy that you can use to make copies of entire disks. It is especially useful if you have a single-drive system, because you don't have to swap disks nearly as often as you must when you use the standard Filer copying program. In fact, you can copy an entire 5¼-inch disk in only three passes.

Of the two, Catalyst is clearly the more polished and the easier to operate, especially for those unfamiliar with ProDOS.

Copying entire disks with MouseDesk is much less convenient and requires a two-drive system. First, you must format the destination disk by selecting the Format a Disk command from the Special menu and then specifying a volume name that is different from that of the source disk. Second, you must drag the icon for the source disk until it is on top of the icon for the destination disk and sit back while the disk is copied, file by file. Then, when copying finally ends (it can take a long time), you must eject the source disk and then rename the destination disk so that it has the same name as the source disk.

Deleting Files

To delete programs or files with MouseDesk or Catalyst, you simply drag the icon for the program or file to the trash-can icon. Once you do this, by the way, the program is gone for good—you can't remove it from the trash later on.

You have to handle custom programs that you add to the Catalyst desktop differently, however. When you drag the icon to the trash, the icon disappears from the desktop, but the program associated with it is not actually removed from the disk. The only way to delete it physically is to use the Filer program.

Installing Disks

As you have seen, when either MouseDesk or Catalyst first starts up, it scans each disk drive in the system and displays an icon for each mounted disk that it finds. If the disk medium is removable, though (as it is for the UniDisk 3.5 and the Disk II), how do you inform the desktop that a disk has been removed or a new one has been inserted?

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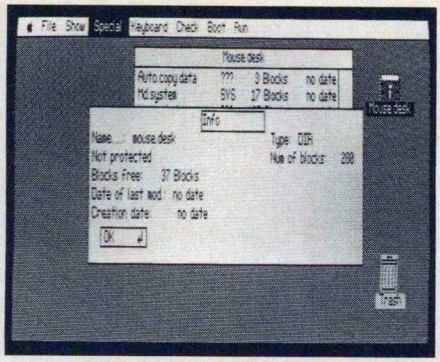

Figure 5: MouseDesk even displays such information about a file as its date of creation and size when you click on the file icon and choose Get Info from the Special menu.

MouseDesk forces you to select the All command from the Check menu whenever you change disks or eject one manually. After that, MouseDesk checks each drive for a disk, and a new set of disk names appears. Catalyst has a similar command (Switch Disks), but you have to use it only if you change 5¼-inch disks. Every three or four seconds, it automatically checks the status of the UniDisk 3.5 drives to see if a disk has been ejected or a new one inserted.

I suppose that a similar check of the status of the Disk II is possible, but such a check would result in an unbearable rat-a-tat-tat sound whenever it took place. In view of this disturbance, the decision not to make periodic checks of the drive is acceptable.

Getting File Information

A quick way to view information about a file on the desktop is to click on its icon and then choose the Get Info command from the Miscellaneous menu (Catalyst) or the Special menu (MouseDesk).

For a commercial program with its own desktop file, Catalyst will show the title of the program, the suggested prefix for the program (for copying), any comments (such as a copyright notice), and whether the program is to be copied to a RAMdisk when Catalyst starts up.

For a custom program, you see the program title, the name of the system file, the program prefix, and the program name.

Several things that you don't see would be useful to know: the time and date of creation, whether the file is locked or unlocked, and the size of the file (or group of files), for example. MouseDesk, on the other hand, does display all this information (see figure 5).

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RAMdisk Support

Since the new Apple II Memory Expansion card and compatible cards such as AST's SprintDisk board look just like a disk drive to ProDOS, both MouseDesk and Catalyst recognize them as such. Catalyst doesn't display the RAMdisk icon, however, unless you select the Show RAM Disk command from the Miscellaneous menu.

A RAMdisk is a convenient place to store commonly used programs because you can load and run them relatively quickly. Of course, you have to copy them into the RAMdisk every time you turn on your Apple computer, because the contents of the RAMdisk disappear whenever you turn off the Apple. In order to simplify the copying process, you can configure both Catalyst and MouseDesk to copy certain files into the RAMdisk automatically the first time you start up the desktop.

To configure Catalyst, you click on the Copy at Start Up button that appears in the Get Info box for the file. Alternatively, you can select the Copy on First Use button if you don't want to copy a file to the RAMdisk until the first time you use it.

With MouseDesk, the procedure is far more complicated. What you must do is create an "auto-load" file list by specifically entering the source and destination pathnames for each file to be transferred. The auto-load file is stored on the MouseDesk disk. This procedure clearly sacrifices simplicity for flexibility (you can send files to a variety of destinations, such as a RAMdisk, a hard disk, or another disk drive), but is this flexibility necessary? After all, in what circumstances would you want to copy files to something other than the RAMdisk every time you started up the MouseDesk program?

Desk Accessories

The first menu in the menu bar for both MouseDesk and Catalyst is the apple menu. The first entry in the menu is an About command that displays copyright information. MouseDesk has no further commands in the apple menu, but Catalyst contains several desk accessories such as those of the Macintosh: a clock, a calculator, and a puzzle (see figure 6).

Miscellaneous Features

A convenient feature of MouseDesk is that you can perform a variety of disk- and file-handling operations without having to run a subsidiary program such as Filer. For example, you can format and erase disks, change the names of files and disks, and lock and unlock files directly from the desktop. Apart from changing the icon names of user-installed custom programs, you can't do any of these things with Catalyst without using Filer.

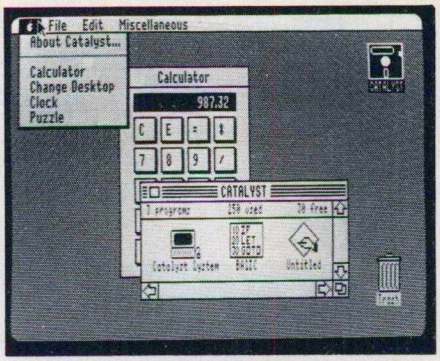

Figure 6: Catalyst contains several desk accessories like those found on the Mac; MouseDesk provides no desk accessories.

Another unique feature of MouseDesk is that it lets you boot from any disk by selecting its slot number from the Boot menu. This ability is useful if you want to leave MouseDesk for good and run a non-ProDOS operating system such as Pascal or DOS 3.3.

A fancy feature of Catalyst enables you to print the screen image on an ImageWriter by entering Shift-4 while pressing the open-apple key. In practice, you won't need to use this feature often, but it becomes particularly useful when you need to illustrate articles such as this one.

Returning to the Desktop

All ProDOS system programs written in accordance with Apple's standard guidelines terminate by making a call to the ProDOS Quit command. This call causes MouseDesk or Catalyst to be reinstalled so that the desktop reappears. To return to the desktop from Applesoft, you must enter the Bye command. In order for Catalyst or MouseDesk to reinstall properly, the files it uses must be present on one of the disks in the system.

Weighing the Alternatives

Both MouseDesk and Catalyst represent laudable duplications of the Macintosh desktop interface on the Apple IIe and IIc. Of the two, Catalyst is clearly the more polished and the easier to operate, especially for those unfamiliar with ProDOS pathnames and subdirectories. Its faithfulness to the standard Macintosh interface is quite remarkable, from the easy-to-

read font it uses for titles and dialog boxes, to the wristwatch cursor it displays when the desktop is busy, to its use of the standard text-editing commands. Another nice feature is that when it starts up, the desk icons and windows come up on the screen in the position they were in the last time you used them.

On the negative side, Catalyst is difficult to use with disks that don't contain its special desktop files; in fact, its use as a file-management tool for these kinds of disks is limited to running programs, since the Copy and Delete operations require the use of the Filer program.

MouseDesk will probably be more useful to programmers, since it lets you manipulate files individually and because the relationship of files to subdirectories is much more apparent. It does not, however, offer many of the nicer Catalyst features, such as a good disk-copying utility, the ability to set up automatic installation and removal of 3.5-inch disks, and a clock desk accessory. I am sure that International Solutions could add many of these features to MouseDesk quite easily; perhaps we'll see them in a subsequent version. ✚

Gary B. Little has written three books on programming the Apple II. His latest is a detailed study of the internal structure of ProDOS, Apple ProDOS: Advanced Features for Programmers *(Brady Communications, 1985). He has been awarded an honorary lifetime membership in the Apples British Columbia Computer Society in recognition of his outstanding service to the users of Apples in British Columbia.*

PRODUCT INFORMATION

Catalyst 3.0
Quark Incorporated
2525 West Evans, Suite 220
Denver, CO 80219
(303) 934-2211
List Price: $149 (free with UniDisk 3.5 inside U.S.)
Requires: Apple IIc or enhanced Apple IIe, 128K RAM

MouseDesk
International Solutions
910 Maude Avenue
Sunnyvale, CA 94086
(408) 773-0443
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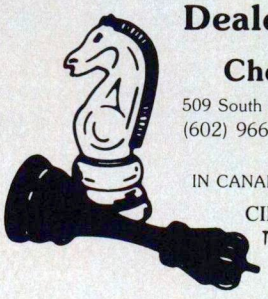

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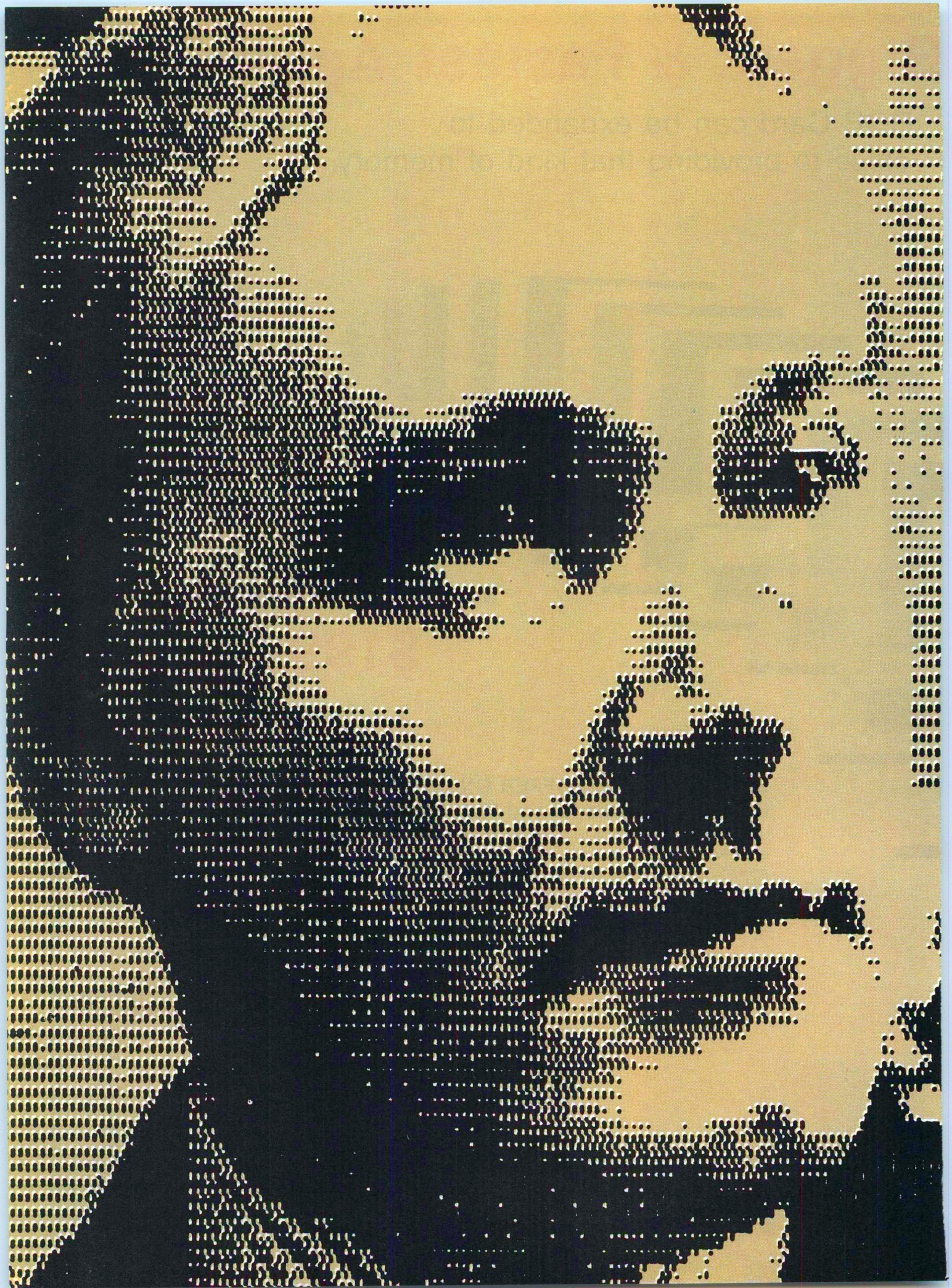


HARDWARE/SOFTWARE

BY ANTHONY REVEAUX

Three video digitizers that work with Apple-II-series computers

EYES for your APPLE

Your Apple II is a world in itself, with its vast capacities for work and play, for learning and teaching, for making and keeping. You are able to reach out through thousands of software programs to other minds and ways of doing things. With video digitizers, your Apple can now see what you see—and bring it back as a file. For computer graphics, you can add the image of your choice to those created with drawing programs or transferred from clip-art disks. For scientific and technical applications, your Apple can interpret light changes with a digitizer, just as it can analyze temperature, voltage, and motion with other kinds of sensors.

A digitizer takes the electronic picture from a video source and translates it into a binary matrix of black or white dots. Your eyes reinterpret its distribution as a pattern as a picture in black, white, and grays. These images are similar to the screen-dot patterns you discover when you look at a newspaper photo through a magnifying glass, but there are distinct differences between that photo and a digitized image on your Apple. A photo is an analog representation of the graphic event that occurred when a burst of light struck a layer of sensitized chemicals. You can modify it with further chemical and mechanical manipulations.

Look again at the newspaper photo in detail, and you will notice that the dots are all different shapes. Now turn the magnifying glass to a digitized image on your computer screen, and you will see that all the dots are rectangles of equal size. These rectangles are called pixels, and each has its own binary address. A digitized picture is created from these tiny pixels the way a wall mural's thousands of ceramic tiles can combine to portray a landscape. Professional graphic workstations driven by big computers, such as LucasFilms' Pixar, produce images that rival color photography in smoothness and detail. But even the most sophisticated high-resolution digitizing with the Apple must result in pictures that may be strong and satisfactory, yet are visibly high-contrast and "crunchy." They are unmistakably computer-derived.

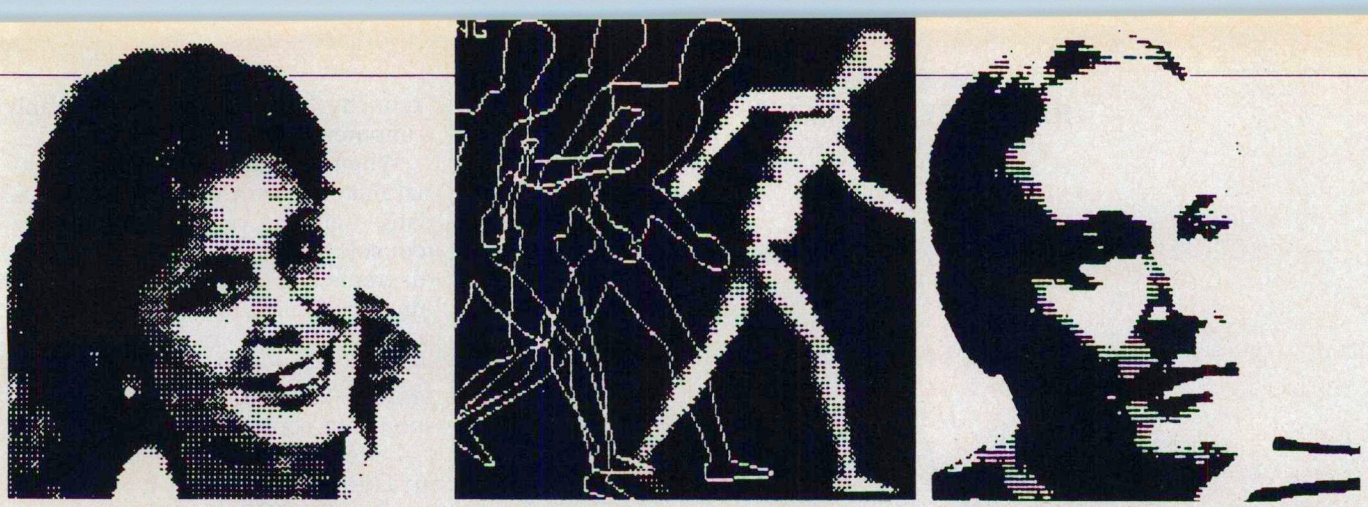
When you need to combine pictorial material with text and numerical data, digitizing can offer a total-system solution. You can directly access diagrams and designs that would be time-consuming for you to draw from scratch. Image manipulation for graphic design and silk screening can provide flexible, instant-replay response to contrast, texture, and special effects. You can extensively clean up a picture and modify it by converting it to ProDOS and bringing it into a graphics program such as MousePaint.

Setting up your Apple for video digitizing requires a certain amount of commitment, space, and intermediate-to-advanced skill. The more experience you've had with photography or video, the easier it will be—but don't let the lack of it stop you. If most of your work will be involved with flat art and documents, invest in a copy stand. A decent one with lights can be had for less than $150. If you need to move the system around in your lab or studio often, your optical Apple can be mounted on a rolling audiovisual cart and the camera on a wheeled TV tripod.

None of the three digitizers we are going to look at here is a simple, point-and-shoot appliance. Documentation is often minimal and unclear. Each demands familiarization with its own special dialect, and you will have to develop an intuitive feel for the "Twilight Zone" look of digitizing's focusing and scanning process to get the final product you want.

Why bother going to the trouble of wiring up a digitizing system when a snapshot might serve as well? When realistic, finished, stand-alone images are necessary, traditional photography is usually adequate. Video digitizing is far more than pictures of pixels, though. It is an image-analysis and readout system that opens up hundreds of different ways of sensing, transforming, and controlling. Because each pixel has an Off or On location code as part of the grid system underlying the image, your com-

IMAGE COURTESY COMPUTECH SYSTEMS



The images above are from Computech's Diplomat Video Digitizer, an advanced British digitizing system available in II Plus and IIe versions.

puter can remember, recall, and regroup it.

The technical ingenuity of video digitizers, even more than their photographic talents, is what's so impressive. For instance, using a digitizer simply as an electronic eye, you can create a diet-alert surveillance system by pointing the lens at the refrigerator and linking the alarm function to a siren. You can station the camera at the cat door and program the system to deliver a printout in the morning revealing the exact times during the night that your cat went out to howl.

The Apple's reputation for muscle—one II running a small factory or power plant, for example—gains ground when we look at what it can do given eyes. Here's a list of just some of the real-world digitizing it's doing now: character recognition; growth measurement of soybeans; insect observation and tracking; light-scattering analysis; type-font digitizing; medical imaging; aerial surveys; strip-chart-data digitizing; robot orientation; signature verification for banks; thermal body scans; and sheet-music reading.

Advanced programmers can customize these digitizers to the point that an Apple can take the place of specialized laboratory equipment that costs thousands of dollars more.

The three digitizers I tested represent a fair cross section, in price and features, of what's available for Apple-II-series computers.

The MicronEye Bullet

The MicronEye Bullet system is compatible with the Apple II Plus and the IIe with at least 48K of memory. The package includes an interface board; software; manual; and a basic, no-frills, camera. Its 16mm f:1.4 C-mount lens and IS32 OpticRAM sensing chip are fixed in a tube that resembles a surveillance instrument and comes with a close-up ring and a little tabletop minipod. This lens-on-a-stick may not make you feel like a Spielberg right away, but it eliminates the extra cost and compatibility considerations of adding a video camera.

Installation of the board, which favors slot 2, is straightforward and simple. A 3-foot ribbon cable from the board to the camera provides you with barely enough slack to let you work with a desktop copy stand or a subject that can be posed near your Apple. For remote sensing and security applications, an OpticRAM with a 50-foot cable is available.

The Apple's reputation for muscle gains ground when we see what it can do given eyes.

The manual contains detailed technical information for enhancement techniques with basic and higher-level languages. For advanced users who want to customize the system for scientific and technical uses, the documentation reveals full breakdowns and listings, including the topology of the OpticRAM.

To get the MicroEye Bullet going as a general-use digitizer, you first boot up the disk to display its main menu. The Start Camera command displays a rectangle in the upper left corner of the screen, the four available image areas ranging from 128×64 to 512×128 pixels. The screen immediately transmits what the camera sees—or doesn't see. You adjust exposure and focus on the lens and set up camera parameters from a menu that lets you choose picture size; display status readouts; and adjust the exposure in milliseconds, with fixed or auto-adjusted exposure.

The Real-Time Command Summary menu lists the commands and modifications that you can invoke while the image is on the screen. The amount of control you have over the picture without having to jump back and forth between menus is an important factor in any digitizer program. Here you can increase and decrease exposure time with keyboard commands, although you have to get used to a relatively slow response, as the OpticRAM performs its alternate scans.

You can save camera settings, which is handy for returning to the copy stand or to the microscope, and activate an alarm function that sounds the Apple's internal speaker when tripped. The MicronEye Bullet's default printer is the Epson, but you can configure other printers and request a data sheet for using the ImageWriter. The GreyPic program assigns different gray-scale settings to multiple scans, pasting together several pictures to yield finer detail. The Enhanced Eye program directly manipulates the pixels, processing between scans to improve image quality. The MicronEye has an image quality that is sometimes rough and picture sizes you may not find convenient, but it is capable of fine resolution and technical applications well beyond the reach of the average user. It is certainly one of the better peripheral values for the money.

The AFG-II Video Digitizer

The AFG-II is a general-use digitizer whose Video System Executive (VSE) stand-alone software package supports graphic-display routines such as real-time displays, slide shows with wipe effects, and poster

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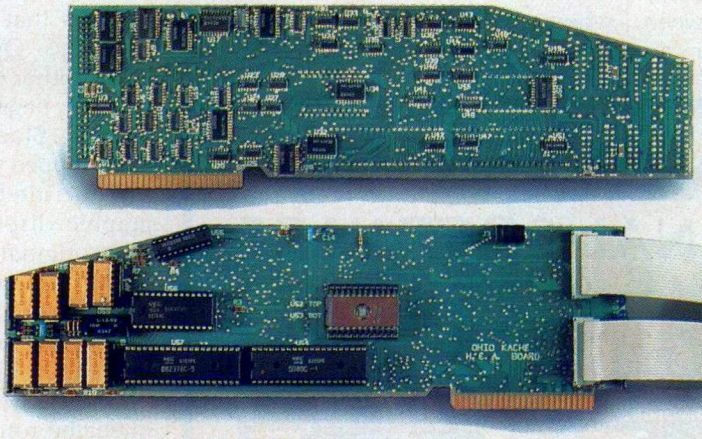

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To date, the Kache Board is only compatible with Apple II+ and IIe systems with hard disk drive; however, boards for IBM, AT&T and Texas Instrument microcomputers are already in final testing stages and will become available later this year.

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printing. The program responds to Applesoft BASIC commands and can be modified and customized. Its interface card installs in any slot (except AUX) in your Apple II, II Plus, or IIe.

The card has five controls on its top edge that you can adjust as you would your TV set for brightness, contrast, and position. These adjustments usually hold for consistent use and become inconvenient only when you have to open up the case every time you go back and forth between very different applications. You can bring in any NTSC video source and connect it to the card's RCA phono connector.

The AFG-II is a very even-tempered digitizer with unusual talents.

The picture comes up immediately when you toggle Start, filling the screen vertically, with only narrow cutoffs on the sides. After adjusting the focus and exposure with the camera, you can use the extensive keyboard commands to go back and forth from the Greyscale mode to the Threshold, or high-contrast, mode, to fine-tune the image. To increase or decrease the frame-delay rate, you use the arrow keys; a "speedometer" type of pop-up display at the bottom of the screen indicates the rate. The Zoom command brings up area markers that you move with the arrow keys. One keystroke zooms in, and another saves the image. Inverse reverses negative and positive fields, and the Block mode turns contours into stepped lines.

The Title function does not create graphic display titles—you need to go to original art for that—but it does insert a line of text at the top left of the screen. Like the tab of an index card, it can provide identification for every image on file. The Picture Display System is a programmable sequencing routine that permits you to make a "slide show" from images on file. You can determine how long each one is on the screen and choose from six different wipes (graphic transitions) to insert between frame changes. The Poster Print System can take an image on file and print it in eight enlarged segments to be taped together like a big puzzle.

This package's Color commands are not as clear as its other controls. Like the other digitizers discussed here, the AFG-II is a monochrome system. With a color monitor and an 80-column card, however, you can make chromatic maskings and enhancements based on extraction and subtraction determined by pattern detection and processing, rather than on any realistic factors. Like the dye stainings of tissue samples in microbiology, all this method does is help separate elements—by color coding—that might otherwise blur together. Weird as they may look, these images can be printed out with the C. ITOH CI8510SP Color Prowriter.

But "Star Trek" on your Apple? Since the AFG-II can display any video input in real time, it can accept TV broadcast signals—although Spock can use a shave here, what with the Apple's coarse resolution. You can grab a frame on the fly, but you may miss the Enterprise by the time the image is saved. A VCR or LaserDisk player with freeze-frame ability is the most accurate source.

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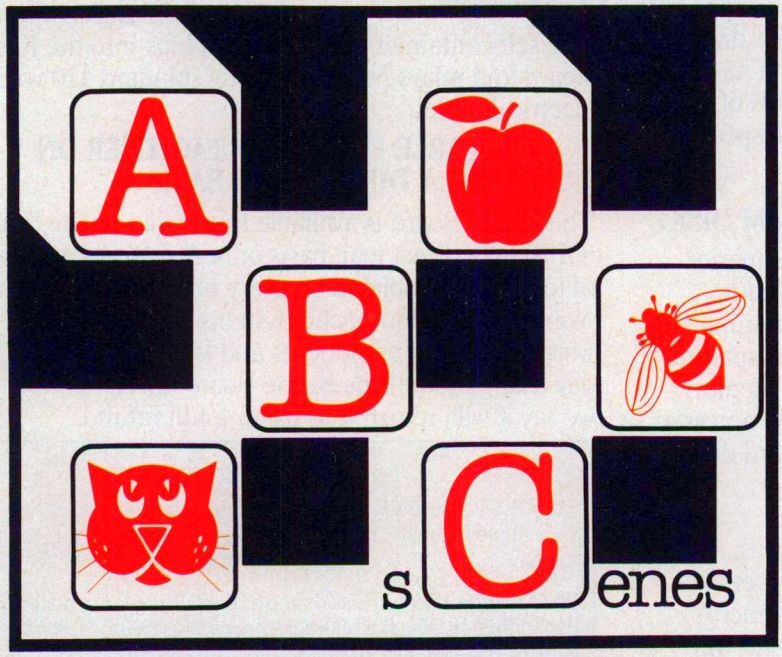

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According to Micro Mainframe, software for the AFG-II is available for visual teleconferencing. At 1200 bps, the screen update runs at the rate of 112 seconds per picture. The company has announced a video-mail software package and already has a bulletin-board system (VEX [916] 635-6175) that includes a library of digitized pictures. The AFG-II is a very even-tempered digitizer with unusual talents that may be perfect for some users and impractical for others.

Computech Diplomat

The Diplomat is an advanced British digitizing system available in two versions, one for the Apple II Plus and the other for the IIe. When fully configured in a IIe, the Diplomat is capable of serial, videographic image capture for time and motion study. You can save up to 60 frames per second to a file continuously in real time, instead of being limited to digitizing a single, static image.

The IIe package includes a main digitizer board that installs in slot 3 and is linked by a ribbon cable to a smaller companion board that goes into the auxiliary slot. If your 80-column card was already there, give it a vacation; the Diplomat takes care of the 64K extension. A firmware card that includes a 2732 EPROM chip wants to go into slot 4. It opens up the system to BASIC programming and provides quad-hi-res imagery of 560 × 384 pixels (the Mac has a 512 × 342-pixel bit-mapped display). Both versions are compatible with DOS 3.3, CP/M, and Pascal.

To facilitate the real-time digitizing of the Diplomat, you'll need a camera with external synchronization—such as the Panasonic WV-1500 series, the RCA 2000 series, or a Sony HVM100CE—and will have to fit the supplied camera cable with compatible adapters. The system includes another cable with a switch, which goes between your computer and monitor and then links to the board. It lets you click back and forth between the digitizing activity of the system and "raw" video when your Apple serves as a video monitor. This function is helpful in planning, setups, and rehearsals, especially when you're using a camera without a viewfinder.

Installation of this system is more complex and error-prone than it is with the other two, and the manual is often opaque about details. But once you have the Diplomat running, you're rewarded with a full-screen image and a flexible set of menus. You can enter almost any command, regardless of which image or menu is up, and you can digitize a frame at a time or continually. Invest in a pair of game paddles for the quickest and most accurate adjusting of the picture thresholds, although every function can be keyboard-controlled. The arrow keys also do a very good, if slower, job of setting thresholds.

Display formats range from the normal-high-resolution 280 × 192 pixels to double hi-res of 560 × 192 and to quad hi-res. The high quality of the Diplomat's images is due in part to a wide gray-scale range, with as many as nine shades of gray simulated through rapid switching between pages. You can copy from one page to another and merge pages to control the intensification of outlines and contours. To take full advantage of the print-dump routines, you should have a second disk drive.

Precise image-processing effects, rather than seamless photographic

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rendition, are what digitizing does best. By adjusting thresholds and contrasts, you can derive outlines of objects. The Diplomat's E command for edge detection, and the K for contour, speed this process up. Cartoon outlines of figures can serve as textile patterns, and shadow lines from aerial surveys can reveal elevation contours for topographical mapping.

It is in applications such as multiple contouring, movement detection, and motion mapping that the Diplomat rises above the other digitizers. You can display any video source on the monitor, but it can digitize only a freeze-frame. According to Computech, the English version can digitize in real time from videotape, but the American IIe one can't at present, because of international time-base synchronization incompatibilities. Even more advanced systems exist that use Apples as the controllers, but they can cost well in excess of $5000. The Diplomat represents the high-end digitizer for the Apple that stays within a reasonable cost.

If you already have an Apple, these overviews should help you zero in on the system best suited to your needs and budget. Find a way to see a demonstration of it in action. If you are investing in a total system, take a close look at the Mac as well. "Lights, Camera, Macintosh" (*A+*, September 1985, pages 137–142) covers five digitizers available for the Mac. They are far easier to set up, learn, and use than the II system.

Find a way to see a demonstration of the digitizing system in action.

The Mac's limitations may steer you back to the Apple II, though. Until the "Open Mac" with slots and a bus arrives, the Mac can do few input/output kinds of jobs for you. Powerful, flexible, and adaptable, the Apple II series remains the cybernetic erector set of choice. ✚

Anthony Reveaux is a San Francisco writer and editor of Computer Publicity News, *a contributing editor of* Artweek, *and a lecturer in film history at Sonoma State University.*

PRODUCT INFORMATION

MicronEye Bullet Video Digitizer
Micron Technology, Inc.
Systems Group
1447 Tyrell Lane
Boise, ID 83706
(208) 386-3800
List Price: $295
Requires: Apple II Plus or IIe, 48K RAM

AFG-II Video Digitizer
Micro Mainframe
11285-E Sunrise Gold Circle
Rancho Cordova, CA 95670
(916) 635-3997
List Price: $299.95
Requires: Apple II, II Plus, or IIe; video source

Computech Diplomat Video Digitizer
Computech Systems
P.O. Box 4748
Foster City, CA 94404
(415) 345-0159
List Price: II Plus version, $295; IIe version, $495; firmware, $95; dump-routines diskette, $25
Requires: Apple II Plus or IIe, video camera with external synchronization

kyan

SOFTWARE for the Apple II Family...

kyan pascal (Version 2.0) for the Apple ***$69.95***

kyan pascal is a ProDOS-based compiler for the Apple II. It's a full Jensen-Wirth/ISO implementation, designed for both beginning and advanced programmers. It's easy to use, lightning fast, and loaded with features like: ■ Optimized 6502 machine code compiler/assembler ■ Full screen 40/80 column text editor ■ String handling and hi-res graphics, ■ Support for source code linking, chaining, and random files, and inline or included assembly source code, and ■ 13 digit arithmetic precision ■ kyan's unique UNIX-like operating environment. ■ ***kyan pascal*** requires only 64K of memory and single disk drive. A CP/M card is not required.

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DAVID JOHANSON

You can hardly pick up a magazine or newspaper these days without seeing some mention of artificial intelligence (AI). This branch of computer science was once restricted to the cloistered halls of universities and large corporate research laboratories, but suddenly, within the last few years, it has become a topic of cocktail-party conversation.

Much of the recent interest in this field has come in response to the Japanese Fifth Generation computer project, an ambitious effort whose goal is the creation of a new class of computing machinery that will make our present computers look like Stone-Age artifacts. AI ventures have replaced genetic-engineering companies as the hot new start-ups of the decade. AI, through the development of "expert systems," has broken out of the universities and into the boardrooms. Thousands of businesses are watching anxiously to see when, how, and whether to transfer some decision-making processes from humans to computers.

Against this backdrop of rapid change, many people are confused about what AI is and what it is capable of doing. The practitioners of this craft include many responsible individuals, as well as a few crackpots who have become modern-day snake-oil salesmen, promising accomplishments that are in fact only distant dreams.

Of all the branches of computer science, AI has been the most oversold. The claims for this field have been so outlandish at times that it is a miracle some of its adherents haven't been laughed out of their offices.

False claims aside, AI is a field worth watching. Its gains, modest as they may seem, are ripe for application. We will continue to see more and more advances from this field showing up in uses ranging from business to education and games.

Artificial intelligence means nothing more than making a computer do something that requires intelligent behavior when humans do it. Does this mean that the computer is a "thinking" machine? No—not at all.

ARTIFICIAL INTELLIGENCE

The next step for computing? AI has broken out of the universities and into the boardrooms.

For example, we can say that artificial flight is making a machine do something that requires flight when birds do it. Our artificial flying machines move through the air, as do birds, but they differ from birds in many special ways (seating capacity, to name just one aspect).

What is bothersome to some of us is that the AI field has some theoreticians who think that because computers can be made to emulate some aspects of human thought, the computers are thinking in the human sense of the word. Humans and computers actually differ markedly in the areas of behavior and thought.

The Intelligent Computer

Douglas Hofstadter came up with a few essential abilities for the demonstration of intelligence, in his book *Gödel, Escher, Bach* (see "References"). For example, he argued that a being demonstrates intelligence by responding to situations flexibly, taking advantage of fortuitous circumstances, making sense out of ambiguous messages, and so on.

The notion that a seemingly inflexible machine such as a computer can be programmed to perform such feats of intelligent behavior may seem paradoxical. Much AI research is focused on ways to make the inflexible flexible.

From a simple perspective, the aspect of computer operation that makes artificial intelligence possible is the ability of a computer program to test for the satisfaction of some condition and then to branch between two sets of instructions on the basis of this test. In many programming languages, this operation is of the form

```
IF predicate
THEN {commands 1}
ELSE {commands 2}
```

If the predicate is true, then the computer carries out commands 1; otherwise, it executes commands 2.

Does this mean that any BASIC programmer who uses an IF ... THEN structure is working with AI? Perhaps, although most AI researchers might argue with this conclusion.

What's Hot and What's Not

Artificial Intelligence researchers have spent a lot of time paving the way for developments in computing that we now take for granted. For example, speech synthesis was a hot topic in AI a few years back, as were the creation of computer-based dictionaries and the development of efficient sorting schemes. An entire genre of computer games, text-based adventures, grew out of explorations with the "machine language" of artificial intelligence, LISP.

Although we take such accomplishments for granted (and therefore don't consider them AI), many new areas are being explored. Researchers in computer vision are dealing with ways to make computers process image information—for example, to let them extract features from a picture that would enable a program automatically to count the number of chairs in a room full of furniture.

Speech recognition has lagged far behind speech synthesis and is an area currently receiving attention from the AI community. Also, the whole domain of robotics is getting support, as is the understanding of natural language by computers.

This list is just the tip of the iceberg, but it shows one characteristic of AI research: The topics of interest to AI researchers have tremendous value to industry.

Advances in these areas can lower the operating costs of large corporations, but they have a corresponding social cost that bears consideration as well. Good speech recognition would allow the creation of automatic data-entry systems, thus displacing many humans from jobs. Advances in robotics might also displace assembly-line workers. Apple's Macintosh factory has far fewer people in it than you might expect, largely because of Apple's extensive use of robots for assembly work.

The branch of AI that is now reaching full bloom is the one associated with expert systems. An expert system is a computer program that emulates the decision-making abilities of a human expert in some field. For example, an expert system in the

field of medicine might be able to help a physician in the diagnosis of a rare blood disease on the basis of test results.

Here is how such a system might behave: The computer asks the doctor for the results of certain tests. When it receives these results, the expert system searches its library of rules, looking for diseases that can produce test results similar to those of the patient. If the computer is unable to distinguish among several possible diseases on the basis of these results, it may ask the doctor to run some more tests whose results may make diagnosis easier. With these results, the computer continues to analyze the available rules to find the probable disease. Finally, it prints out the likely cause of the patient's grief (along with other possible causes) for the doctor's consideration.

An expert system emulates the decision-making abilities of a human expert.

At first glance, the rules in an expert system resemble IF . . . THEN . . . ELSE statements. The main difference is that an IF . . . THEN . . . ELSE statement is like a switch. The computer takes either one or the other branch. The predicate portion of the statement is either true or false—there is no middle ground. The case is not the same for most expert systems. Rather than restricting the rule to producing a true or false result, the programmer can allow for likelihoods or probabilities. This ability of the computer to deal with ambiguous information is essential to the operation of many expert systems, and it is one way to distinguish such systems from the types of programs we most often write.

For example, consider the statement "I am tall." In most computer programs, this statement has to be considered either true or false. Since I am six feet two, you might decide that this statement is true, although some cultures consider my height short. Expert systems let you associate information of this sort with a likelihood of its truthfulness. In this case, I might say, "I am tall. (0.8)," where 0.8 is the truthfulness of this statement. By carrying this "fuzzy" information along in the myriad decision-making steps it can perform, an expert system can calculate the validity of the final conclusion and express it as a number.

For example, an expert system designed to help you pick a new computer might ask you a series of questions about your intended uses for the machine and present the following results:

Apple Macintosh (0.8)
Apple IIc (0.4)
Apple IIe (0.4)
Atari ST (0.2)

The numbers next to each item reflect the likelihood (based on the rules the system used to reach a conclusion) that that computer is the correct choice.

Expert-system programs of this type are capable of making inferences on the basis of the information you provide. Such a program consists of two major parts: a set of rules that express the expertise of a particular domain and an "inference engine," whose job it is to perform all the searches and calculations it needs to draw a conclusion.

Although expert systems have been able to perform as well as human experts in fields ranging from medical diagnosis to the location of off-shore oil deposits, they lack one characteristic of human problem solvers. As soon as you get to the boundaries of an expert system's domain of expertise, its performance falls off precipitously. Human problem solving is not like that at all. In fact, we humans are quite good at taking concepts from one domain of expertise and applying them to others.

Nonetheless, a large commercial market exists for expert systems that can be used when human experts are too hard to find or too expensive.

The performance of an expert system is limited by the completeness and accuracy of the rules it contains. Some expert systems using as few as 200 rules rival the performance of humans. Because these rules can be fairly lengthy and because the inference engine has to examine possibilities that grow exponentially at each level of the search, most high-performance expert systems involve fairly large computers. Though most expert systems are meant for large computers, several products are designed for desktop computers such as the Mac.

THE LANGUAGES OF AI

Because AI programs work with symbolic information of many types and are often capable of modifying themselves, they are usually written in special computer languages, a few of which are only now beginning to appear on machines as small as a Macintosh with 512K of RAM.

The granddaddy of AI languages is LISP, developed in the 1950s. This language (whose name stands for LISt Processing) accounts for the bulk of the AI programs written in the United States. Available in numerous dialects (including one called Franz LISP), the language has at least one version (ExperLISP from Expertelligence) for the Macintosh.

Because Logo (see my article "Logo" in this issue) is an offshoot of LISP, it is also suitable for the exploration of AI programming. The availability of this language on Apple II computers as well as the Mac makes it a suitable entry point for those who want to try their hand in this field.

LISP is used throughout the world, but it competes with another language, PROLOG, in many countries. PROLOG programs resemble theorems, so this language is a natural for the creation of rule-based expert systems. Versions of PROLOG for personal computers are commonplace in the United Kingdom but are rare here. PROLOG has received a lot of attention because of its use in the Japanese Fifth Generation computer project, so you'd expect it to have grown more in popularity.

Although these languages account for the bulk of the AI programming taking place throughout the world, some less-esoteric languages are suitable for the task, provided you are willing to do a lot of work. One of these is the object-oriented extension to Forth called Neon (available for the Mac from Kriya Systems—see "Neon" in this issue), and another is Forth itself.

For those interested in constructing an expert system, several expert-system "shells" are on the market that allow the creation of rule-based programs without the labor of having to build an inference engine from scratch. Two packages that come to mind are for the Mac: ExperOPS from Expertelligence and Nexpert from Neuron Data Systems.

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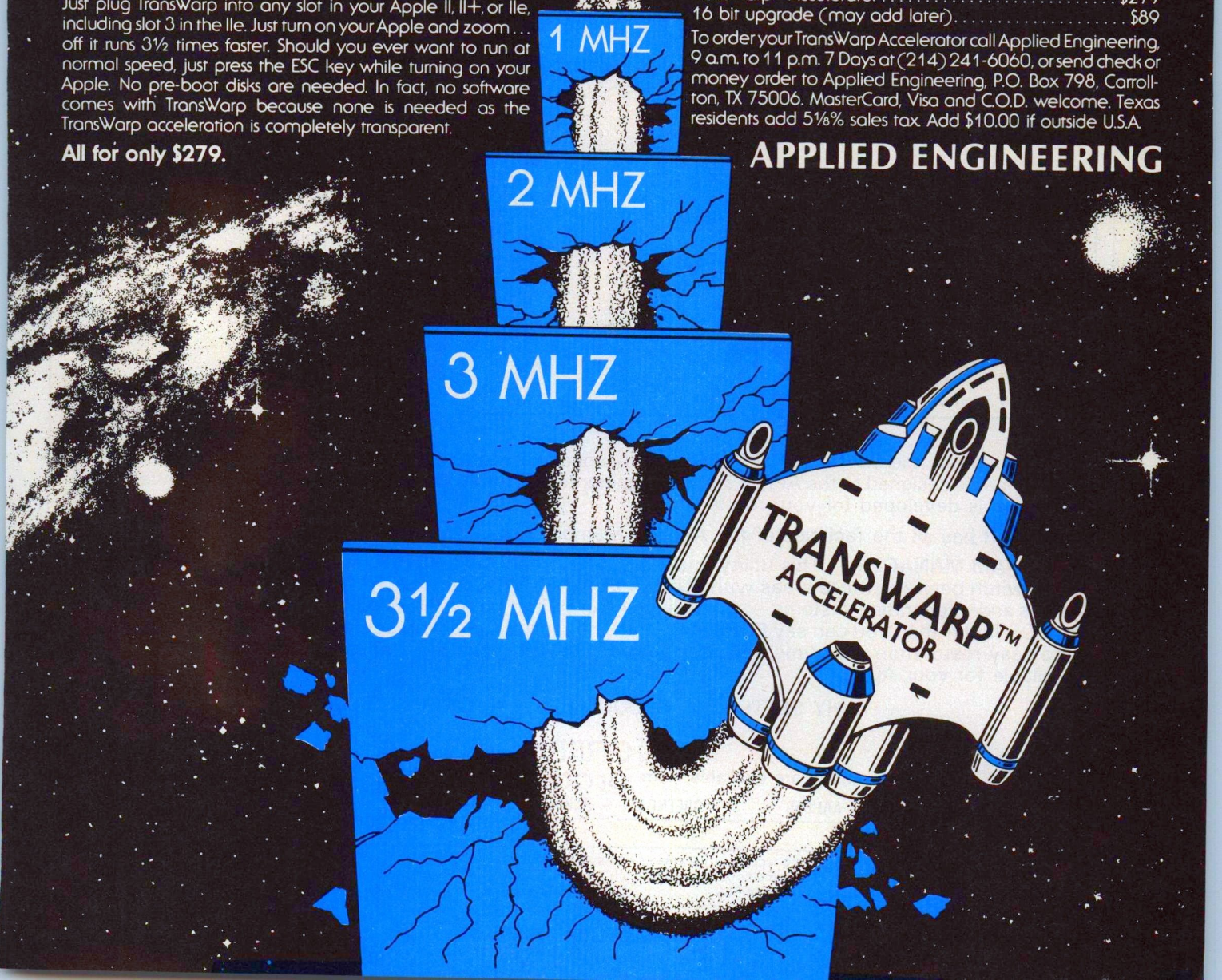

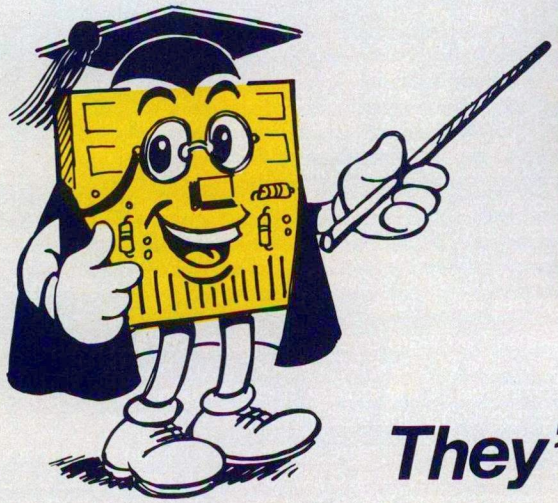

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AI and Natural Stupidity

Alan Turing, one of the grandfathers of computer science, once proposed a test for machine intelligence. He suggested placing two terminals in a room, one connected to a remote computer system and the other connected to a remote terminal at which a human was sitting. Turing argued that if a person in the room was free to enter into a dialogue with either of the two terminals and couldn't tell which terminal was connected to the computer, then you could say that the computer was displaying intelligence.

An expert system's performance is limited by the completeness and accuracy of the rules it contains.

This "Turing test" has formed the basis for many interesting experiments. One of the early dialogues between humans and machines was the result of Joseph Weizenbaum's Eliza project in the 1960s, in which a computer was programmed to simulate the behavior of a Rogerian psychotherapist conducting a first interview with a patient. The computer program was able to pick key words and phrases from the human's entries and form a response based on these. For example, if the patient said, "I don't like talking with computers," the computer program might have responded, "Why don't you like talking with computers?"

This program was also set up to look for the absence of certain words in a user's statement. If the words *mother* or *father* didn't appear after a while, the computer might query, "Why haven't you said anything about your parents?"

This program's ability to "understand" English was crude, but it succeeded in impressing a lot of people. Racter is a modern version of this type of interaction, designed for personal computers. This program (from Mindscape) incorporates a limited capacity to "understand" your entries, along with an ability to create syntactically correct sentences and to recall entries from a library of quotations. So, when you use the program, you have a dialogue with Racter, an apparently deranged person. A brief sample dialogue follows—my entries are preceded with an arrow:

Dave, do you like happiness?
▶ I like happiness just fine.
If you like happiness just fine then Job is more noble than Jane Fonda. Little Orphan Annie liked mellow depression. If it's not too personal a question, do you have a soul?
▶ Yes.
Yes? What does it mean to have a soul? Maybe this will explain: Once Little Orphan Annie was discussing indecency with a rattlesnake. Job came along and said "Little Orphan Annie, your soul is just an amusement of your body." Let me tell you something about depression. Let me smile with the smilers and feed with the rich. Next question.

The Next Question

Can machines think? Do pigs have wings? It beats me. Maybe we should ask Racter. ✚

Dr. David Thornburg has been active in the field of personal computers since 1978. He is the inventor of the KoalaPad touch tablet and principal designer of Muppet Learning Keys. He has written more than ten books on computing.

REFERENCES

You can find myriad references on the topic of artificial intelligence, and I have listed only a few of them here. Those of you who have Logo may want to tinker with some of the AI projects in *Beyond Turtle Graphics*, and those of you who think the field is full of charlatans will find comfort in the Dreyfus book.

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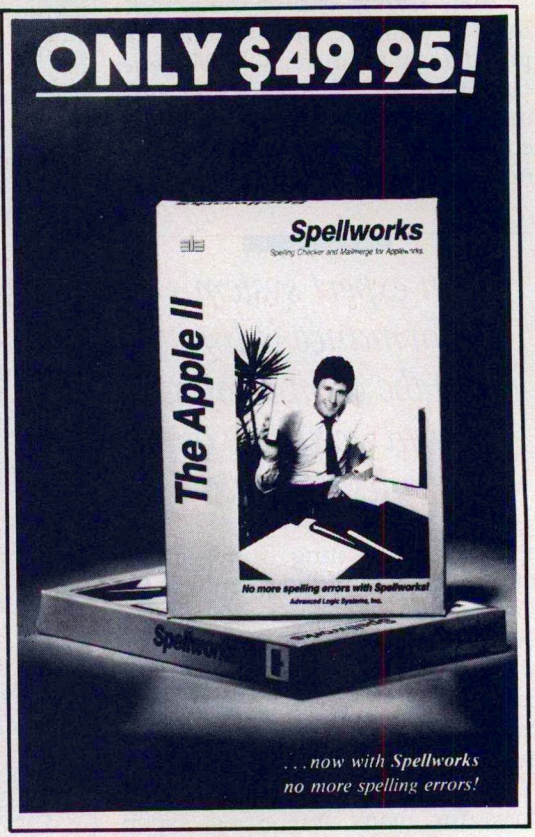

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A Glossary of Terms

BY STEVE ROSENTHAL

AppleWords

For use with "Artificial Intelligence" on pages 54–59

ADVISER SYSTEM
A computer system or program that works interactively to help users understand or take action concerning a selected area.

ARTIFICIAL INTELLIGENCE (AI)
A machine's ability to mimic or improve on the human ability to comprehend and reason. Some of the more active areas of research and development right now are problem solving, symbolic reasoning, and natural human-language input.

ASSERTION
A statement expressing whether a particular state, qualification, or condition is true. Assertions are one component of most knowledge bases.

BACKWARD CHAINING
Working backward from conclusion to premises. This technique is often used to select from a set of possible solutions or to demonstrate how a system arrived at a conclusion.

BIDIRECTIONAL SEARCH
A search from conclusions going backward to premises (backward chaining) as well as forward from premise to conclusion.

COMBINATORIAL EXPLOSION
A description of the rapid increase in possibilities that occurs when you try to consider all the possible implications of a path whose every branch leads to a further choice of paths. The classic example is a chess game, in which each move leads in turn to a whole new set of possible moves and countermoves.

CYBERNETICS
The study of systems that depend on feedback for their proper operation. It includes not only parts of robotics, artificial intelligence, process control, and mechanics, but also computer design and operation.

DATA FLOW
A method of organizing how a computer reads and processes data. In the data-flow method, data is split into units needed for processing, and when possible the processing of each unit takes place independently in parallel. Each step occurs as soon as the input data for it is available, instead of being synchronized with a master program counter.

DOMAIN
A defined area of knowledge or experience, particularly one that would provide a useful sphere of action or advice if a computer system mastered it.

EXPERT SYSTEM
A program that attempts to simulate the problem-solving ability of a human expert in some restricted field of action. Most comprise a knowledge base and inference engine (software for processing the knowledge). Most so-called expert systems for personal computers have only the inference-engine part of the system—the user has to provide the knowledge base in suitable form.

FIFTH GENERATION
Applied to computers, a class of machines expected to become available about 1990 that should use ultralarge-scale integrated circuits, parallel processing architectures, and new dense packaging. They are being built to run applications such as natural-language processing, machine vision, speech recognition, and expert planning.

FOURTH-GENERATION LANGUAGE
In general, a computer language that relies on its users to state the key relationships and the inputs and desired outputs for a problem, but has the system generate the procedural data-processing steps.

HEURISTIC
A general rule or approach used to guide processing and choose among alternatives. Rather than explicitly stating what is to be done in every instance, the heuristic is a rule of thumb that acts as a strategy.

ICOT
An abbreviation for Institute for New Generation Computer Technology, the Japanese organization set up in 1982 to undertake the "Fifth Generation" computer project.

INFERENCE ENGINE
The part of an artificial-intelligence program that applies rules to reach conclusions, make choices, or suggest alternatives. The engine provides the method, and a separate knowledge base holds the necessary data.

JUSTIFICATION
A report of how a conclusion was derived.

KNOWLEDGE BASE
The part of a knowledge system that contains facts and rules. It works together with an inference engine to make up a complete knowledge-based or expert system.

KNOWLEDGE ENGINEERING
The discipline of putting facts, expertise, and experience into a form that can be used for computer processing, particularly processing by artificial-intelligence programs.

LISP
The computer language that most North American artificial-intelligence

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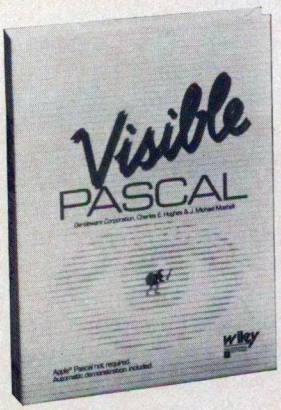

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workers prefer. Developed originally by John McCarthy in 1958, LISP (which stands for *list processing*) is intended for processing symbolic information rather than numeric data.

MACHINE LEARNING

In the more general sense, the encoding or entering of information into an AI system. Often, the term is used specifically for a system in which the computer itself extracts the relevant information from a larger database.

NATURAL LANGUAGE

A language spoken among people and defined by usage, rather than the formal, structured languages most often used between people and computers.

NON-VON

Computer architectures that don't depend on a single main processor to fetch data and instructions sequentially from common storage. Although the latter approach has served well for general-purpose computing for several decades, most designers of new high-performance systems believe that some degree of parallel processing or data-driven architecture will be necessary to achieve the performance needed for computation-intensive jobs such as AI work. The *Von* in Non-Von refers to John Von Neumann, credited with developing the more widely used architecture in the 1950s.

OBJECT-ORIENTED LANGUAGE

A computer language based on descriptions of logical objects, each of which has a data structure and a set of valid operations that can act on it. Smalltalk and Neon are two examples.

PARSE

To analyze the structure of a statement, particularly to break down a more complex linguistic expression into basic units for further processing.

PRODUCTION RULE

A statement of how to go from existing data to a further statement or final conclusion. The most common form is an "if-then" sentence, which expresses a condition and an action.

PROLOG

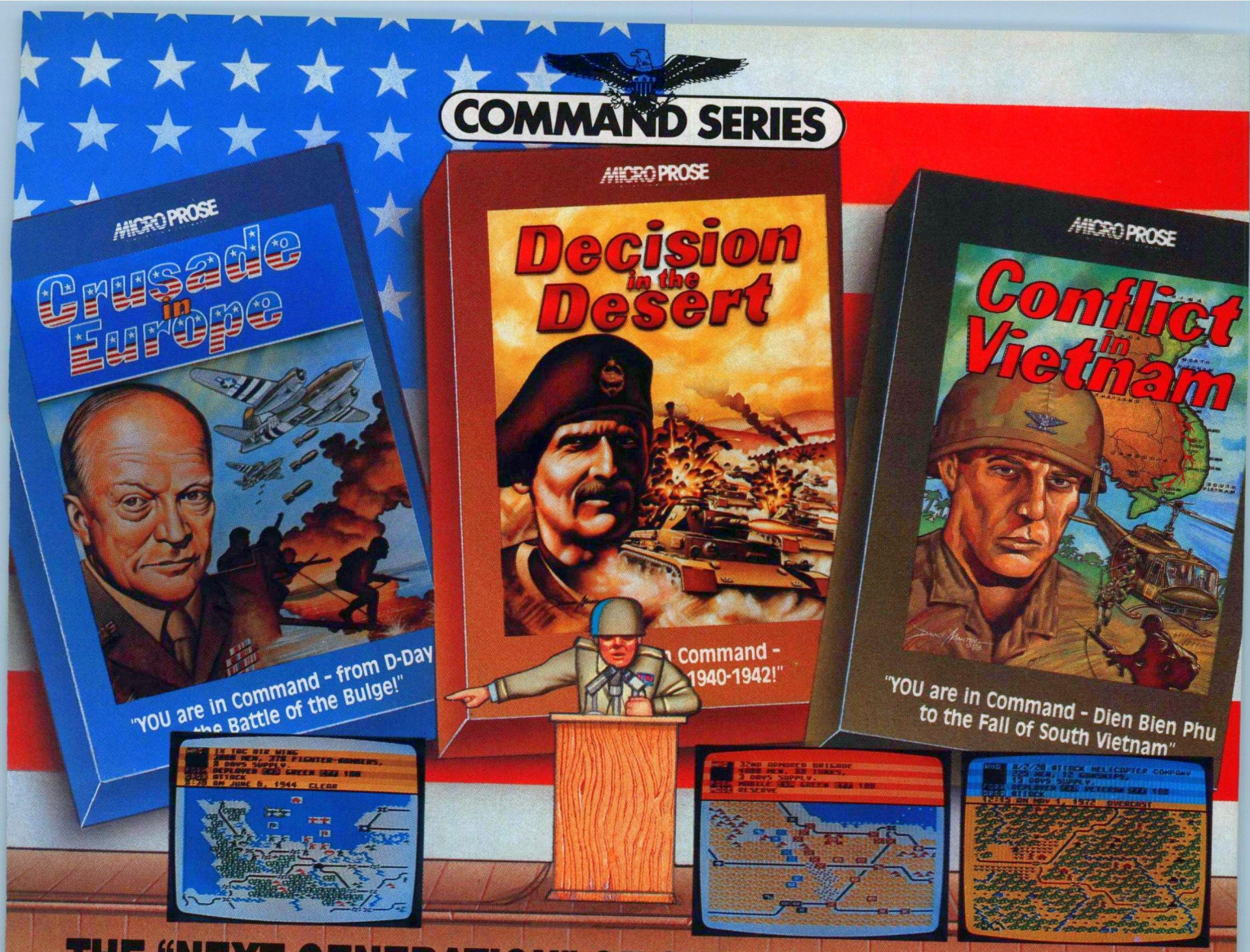
A computer language popular in artificial-intelligence work because it focuses on logical relations among objects (PROLOG stands for PROgramming in LOGic). Developed in Europe starting in the early 1970s, it has recently been chosen as the development language for the Japanese Fifth Generation computer project.

RULE

A statement of what is to be done in a specified situation. In artificial-intelligence programs, rules are often stated in "if-then" form.

TURING TEST

One of the standards for judging artificial-intelligence programs, originally proposed by Alan Turing in 1950. In this test, a group of judges conversing over two teletypewriters attempts to discover which link connects to a person or group of persons, and which to a computer. If they cannot tell, then the computer must be considered intelligent. +



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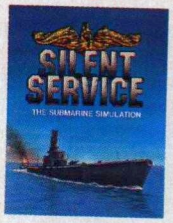

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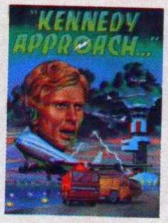

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BUSINESS ACCOUNTING	BPI Accounting—*BPI Systems*
PERSONAL FINANCE	Dollars & Sense—*Monogram*
SPREADSHEET	AppleWorks—*Apple Computer, Inc.*
INTEGRATED	AppleWorks—*Apple Computer, Inc.*
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SPREADSHEET	Multiplan—*Microsoft*
INTEGRATED	Jazz—*Lotus Development Corp.*
MUSIC	Music Works—*Hayden Software*
PROJECT MGMT.	MacProject—*Apple Computer, Inc.*
UTILITIES	*Copy II Mac*—Central Point Software

Two Internal

This year, the big news in Apple II hard disks comes from two small companies, Space Coast Systems and CMC Computer Systems. They are offering internal 3½-inch 10- and 20-megabyte hard disks for the Apple IIe.

Since the advent of ProDOS in 1983, hard-disk drives have become an increasingly popular Apple II peripheral. ProDOS made accessing hard-disk files much easier than it had been previously. As user demand grew, competition heated up among third-party hard-disk manufacturers. A little over a year ago, First Class Peripherals set a new price standard for 10-megabyte Apple hard disks with its Sider. Originally $795, this mail-order item now retails for $695.

This year, the big news in Apple II hard disks comes from two small manufacturers, Space Coast Systems and CMC Computer Systems, that are offering internal 3½-inch 10- and 20-megabyte hard disks for the Apple IIe. The Space Coast Challenger and CMC Quick-10 and Quick-20 internal drives fit in the space that the IIe's power supply normally occupies. The drives contain a larger power supply that is sufficient to power both the drive itself and the rest of your Apple (see photos, facing page).

With prices starting at $1159, these units give your Apple loads of storage without eating up extra desktop space. Before we get into the specific features and advantages of these drives, however, we have to consider a serious compatibility issue.

Newer IIe's Only

Both of these drives are victims of a change in the design of the IIe case. The two manufacturers designed their units to fit the new IIe case, apparently without realizing that the newer case had some internal differences from the older case. In the older IIe case, the keyboard was held in place by two metal brackets fastened to the metal base of the computer. After the change, the keyboard was fastened to the plastic upper half of the case. The older case also contains some extra vertical plastic supports that are absent in the newer case.

As of this writing, if you have an older IIe or a II Plus, the current models of these drives simply won't fit your computer. CMC president Charles McConathy says his firm has no plans to change the design of its internal drive to fit older IIe's. Space Coast representative Linda Grimbly says a new version of the Challenger will be available by the time you read this article. The new Challenger model will fit older IIe and II Plus computers, as well as newer IIe's.

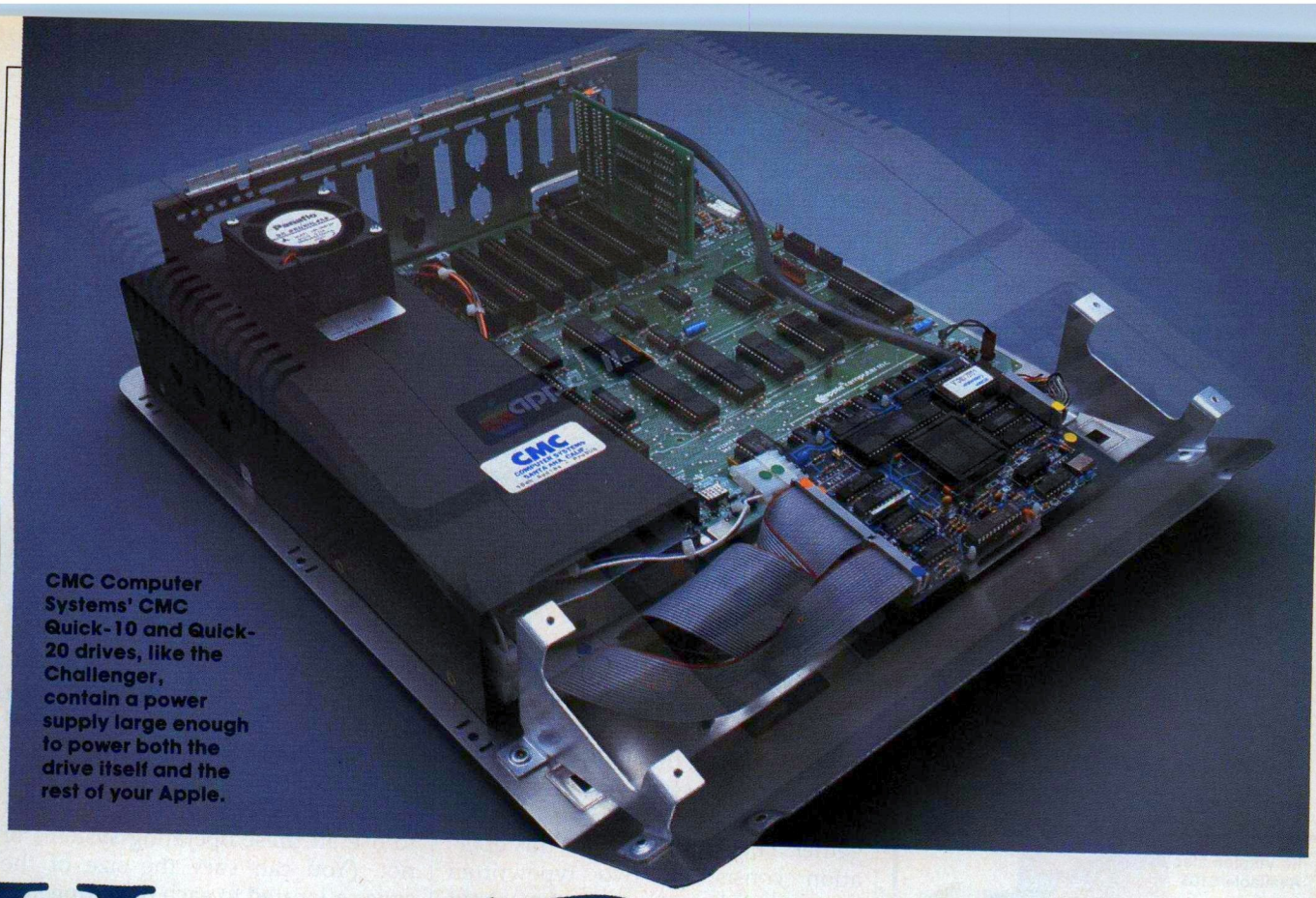
The simplest way to tell which type of case you have is to remove the lid of the case and look at the inside. Older cases have two small platforms about half an inch wide extending out from the inside right and left rear sides of the case—these platforms help support the lid when it is in place. The newer cases don't have these platforms, because the lid has a different design that makes them unnecessary. Some other clues: The old case is held to the metal computer base with 12 screws, but the new case uses only 9 screws.

Assuming that you can resolve the case problems to your satisfaction, these drives may be worth a look because of advantages such as good software, quiet operation, reliability, and portability.

CMC CHOICES

CMC Computer Systems actually offers six different internal hard-disk systems, which are distinguishable by the operating systems they work with and the way they connect to your Apple. Four models are ProDOS-only systems that come formatted as one large ProDOS volume, in either 10- or 20-megabyte versions. These drives behave exactly like an Apple ProFile does—they come without software, and you must use the ProDOS User's Disk to copy files or programs to them.

Even if you do have a newer IIe,



CMC Computer Systems' CMC Quick-10 and Quick-20 drives, like the Challenger, contain a power supply large enough to power both the drive itself and the rest of your Apple.

Hard Disks for the IIe

The Space Coast Challenger internal drive fits in the space that the IIe's power supply normally occupies.

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installing a CMC drive is more complicated than installing an external hard disk. Because of space limitations inside the hard-disk housing itself, the controller circuitry comes on a separate circuit board that mounts between the hard disk and its interface card. CMC's drive differs from the Space Coast drive in this respect, and CMC's McConathy says the controller was kept separate to leave room for a 75-watt power supply inside the hard disk's housing (a standard Apple power supply is 30 watts, and Space Coast's drive uses a 50-watt power supply).

To install a CMC drive, therefore, you must remove the plastic upper part of the case; install a bracket underneath the keyboard; install the controller card on that bracket; install the interface card; replace the power supply with the hard-disk/power-supply unit; run three different cables between the hard disk, controller, and interface; and put the case back together. The instructions for this operation consist of two typewritten pages, and the operation takes about 45 minutes to perform. Nonetheless, the process isn't for the technically fainthearted, and even CMC admits that dealers will usually be the ones who do the installation.

The difference between the ProDOS models is that one pair (10- and 20-megabyte versions) can connect to your IIe through slot 7 only, and the other pair can connect via slots 4, 5, 6, or 7. CMC claims that the models that are restricted to slot 7 run about 25% faster than the others do (since ProDOS doesn't have to scan four slots each time it loads a file or program segment to determine where the hard-disk interface is located). On the other hand, you may want a wider choice of slot locations if you plan to connect a second, external hard disk in a different slot.

The other two models support ProDOS, DOS 3.3, CP/M, and Pascal, using CMC-supplied NovoComp software. You have to connect these models through slot 6 in the IIe, and you pay an extra $150 for the software. The NovoComp software, developed in West Germany, has been in use there for three or four years, according to CMC's McConathy. The NovoComp software is quite sophisticated, but you trade some ease of use for the extra power.

If you buy a system with NovoComp software, the hard disk comes

Assuming you can resolve the case problems to your satisfaction, these drives may be worth a look.

preformatted with one DOS 3.3 volume that contains the NovoComp DISKINIT software, the software you use to create additional volumes, set user privileges, and perform other hard-disk-management tasks. (You also get DISKINIT on a floppy disk for backup.)

Most hard-disk software that works with multiple operating systems strictly limits the number of volumes you are able to create for each operating system. The Sider's original software, for example, forces you to create space for Pascal, CP/M, DOS 3.3, and ProDOS, whether you want to use all these operating systems or not. (You can vary the size of the space allocated to each operating system, however, so if you want to use ProDOS only on your hard disk, you can cram the other three operating systems into less than 500K and leave the rest for ProDOS.) The Sider program further restricts the composition of each operating-system area—you must have two equal volumes for the ProDOS area, four volumes for Pascal, and so forth.

DISKINIT, on the other hand, is totally configurable—you begin with one 243K DOS 3.3 volume, and you can choose to create more DOS volumes (up to 253 of them), Pascal volumes (up to 63), CP/M volumes (up to 63), and ProDOS volumes (up to 6). You don't have to include any space for operating systems you aren't using—the whole disk can be one ProDOS volume, for example.

Easy Access

This ability to define so many volumes wouldn't be much good without an equal ability to get at a particular volume easily, and DISKINIT provides it. You can boot from any volume in any operating system and switch between operating systems easily. Individual files and volumes can be public, private, or write-protected.

You can also assign different user configurations and key words, so that one user has access only to certain volumes or operating systems while

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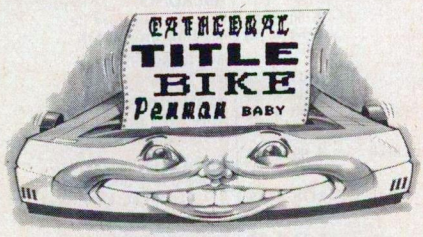

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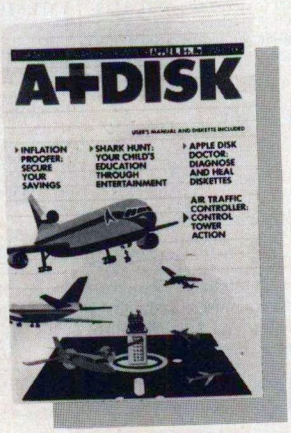

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another user has greater privileges. You can configure each user's privileges so that a particular program on a particular volume boots automatically upon entry of that user's key word. The ability to assign user privileges is particularly useful in a network setting, so this software and hardware will be appropriate in an AppleTalk network when the IIe AppleTalk interface card is available.

Curiously, with all its utilities, the DISKINIT software doesn't have a built-in backup utility, as do many other hard-disk programs. The manual recommends that you use Apple's Backup II program.

The trade-off for all of DISKINIT's power is that the system isn't nearly as easy to use as are those with more limited software options. Setting up volumes, users, and boot software is a fairly time-consuming process that isn't helped by the somewhat confusing 92-page manual. A third complication is that the NovoComp software was written as a generic hard-disk-management program, and some of the instructions don't take the specific operating characteristics of the CMC drives into account.

Speedy Operation

In operation, the CMC drives are quite fast—faster than the external hard disks I've used—probably because the seek time on a 3½-inch disk is bound to be shorter than it is on a 5¼-inch disk. Although I expected the internal drive to be quieter than an external model, it was actually about as noisy as an external drive. The drive and software performed as advertised, and the larger power supply and built-in fan are decided advantages.

In sum, the CMC drives offer a range of choices for a range of users. If you want a quick, easy ProDOS storage solution, the ProDOS-only drives are fairly simple to install and use (although the extra controller card makes installation more complicated than necessary), and you can choose the slot (if you buy a model that interfaces through slots 4–7).

If you want a high-powered, flexible hard-disk-management system that allows multiple users with different privileges, you can pay $150 more for the NovoComp software. With the NovoComp system, however, you should be prepared for some close perusal of the manual and experimentation before you get things working the way you want.

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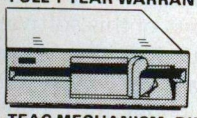

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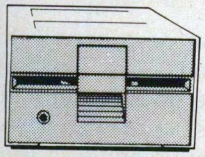

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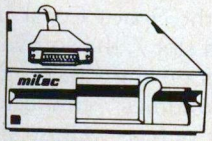

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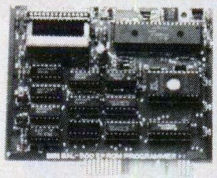

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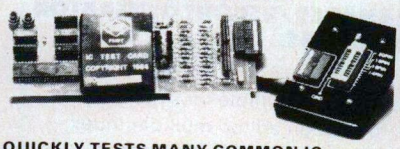

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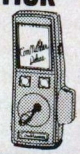

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CIRCLE 167 ON READER SERVICE CARD

If this system interests you, though, bear in mind that it fits only in newer IIe computers.

SPACE COAST CHALLENGER

The 10- and 20-megabyte Challenger hard disks from Space Coast Systems manage to offer most of the flexibility of the CMC drives with less hassle. Installation is a matter of replacing the IIe power supply with the Challenger unit and connecting one cable to an interface card in slot 7. Allow half an hour to do the job.

The Challenger comes preformatted, like the CMC drives, and is set up with two ProDOS volumes: a small one for the ProDOS operating system and its utilities and a large one for programs and data files. If you're running only ProDOS programs, you can be using this drive within a minute or two, once it's installed.

Software Utilities

Like the CMC software, Space Coast's utility software lets you configure your hard disk flexibly. You can add up to 16 DOS 3.3 volumes, up to 8 megabytes of CP/M space, and up to 6 Pascal volumes. Space Coast has modified DOS 3.3 to recognize volumes up to 2 megabytes in size.

Each operating system is accessible through a different user name, much as with the CMC software. You can specify up to 64 different users, each of whom can have access to several volumes. You can mount or unmount volumes to change user access, and volumes can be write-protected. You might, for example, set up a volume with the AppleWorks program on it and specify that that volume is for the user named AWKS. When that name is entered, AppleWorks boots automatically from its volume, and the user can have access to several more ProDOS volumes for data. The flexible user-

For advanced users, these systems feature highly flexible software.

configuration options of this software are intended to support the SpaceServer, a Space Coast network system that turns a Challenger into a network server for Apple and IBM PC computers.

The manual that describes all this user configuration and volume mounting isn't the finest example of the genre, but it is somewhat clearer than the NovoComp manual. A tutorial steps you through the setup of users and volumes for ProDOS, DOS, CP/M, and Pascal.

Even though the Space Coast interface must be in slot 7, the software permits programs on the Challenger to recognize volumes connected through slots 4, 5, or 6, as well, so you can install a second hard disk, floppies, or a backup system. Space Coast sells its own streaming-tape backup system for the Challenger ($1995) that connects in-line between the hard disk and interface card. The Backup/Restore utility in the Space Coast software lets you easily back up all data on the hard disk to tape, floppy disks, or another hard disk.

The Challenger is much quieter than the CMC drive, because the unit's fan is located inside the case, instead of being mounted on top of it. The Challenger finds data just as quickly as the CMC unit does.

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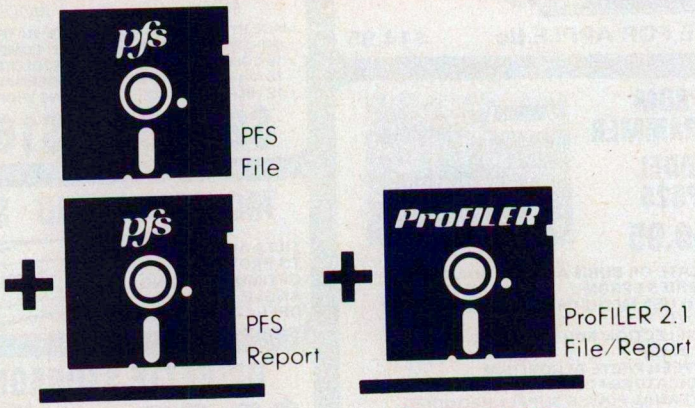

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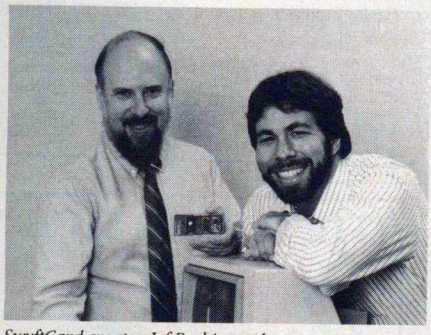
Steve Wozniak calls it revolutionary, adding "If I had thought of the SwyftCard while creating the Apple II, I would have built it in." Fomenting revolutions comes naturally to SwyftCard inventor Jef Raskin, whose previous efforts to make computers simple and useful include creating the Macintosh™ project at Apple.



SwyftCard creator Jef Raskin and Apple II creator Steve Wozniak

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CIRCLE 137 ON READER SERVICE CARD

Overall, the Challenger is simpler to install, quieter, and nearly as flexible in its configuration options as the CMC drives. The new Challenger design, available since January 1986, lets this drive fit inside any Apple IIe or II Plus.

The ultimate question for somebody considering one of these internal hard-disk systems is whether the extra price (about $500 more than some external drives) is worth it. For the extra cost, you get better portability for your computer and the speed advantages of a 3½-inch hard disk over the external, 5¼-inch hard disks. The internal drives from both companies are shock-mounted and should prove more resistant to damage than an external system when you move your computer. For advanced users, these systems feature highly flexible software, and you can get a streaming-tape backup system for the Space Coast drives.

So, if you need portability for your IIe, if you're concerned about reliability when moving your system around, and if you require sophisticated hard-disk-management software, these drives may be worth the extra cost. If, however, you're a typical user with a deskbound system and less demanding software needs, you may want to think carefully about whether or not you really need what the extra money can get you. ✚

Charles Rubin is the author of AppleWorks *and* The Endless Apple, *both from Microsoft Press. He writes about computing for various magazines.*

PRODUCT INFORMATION

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CMC Computer Systems
1514 East Edinger, Suite H
Santa Ana, CA 92705
(714) 835-2462
List Price: Quick-10, $1159; Quick-20, $1395; NovoComp software, $150
Requires: Apple IIe (new case design only)

Space Coast Challenger
Space Coast Systems, Inc.
P.O. Drawer 2767
301 South Washington Avenue
Titusville, FL 32781-2767
(305) 268-0872
List Price: 10 megabytes, $1195; 20 megabytes, $1595
Requires: Apple II Plus or IIe

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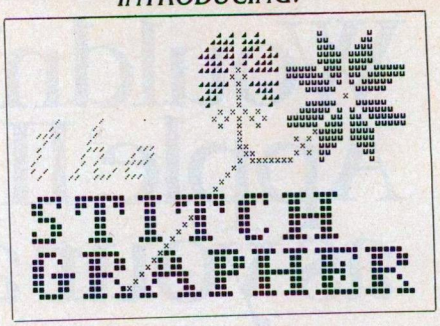

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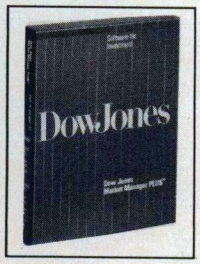

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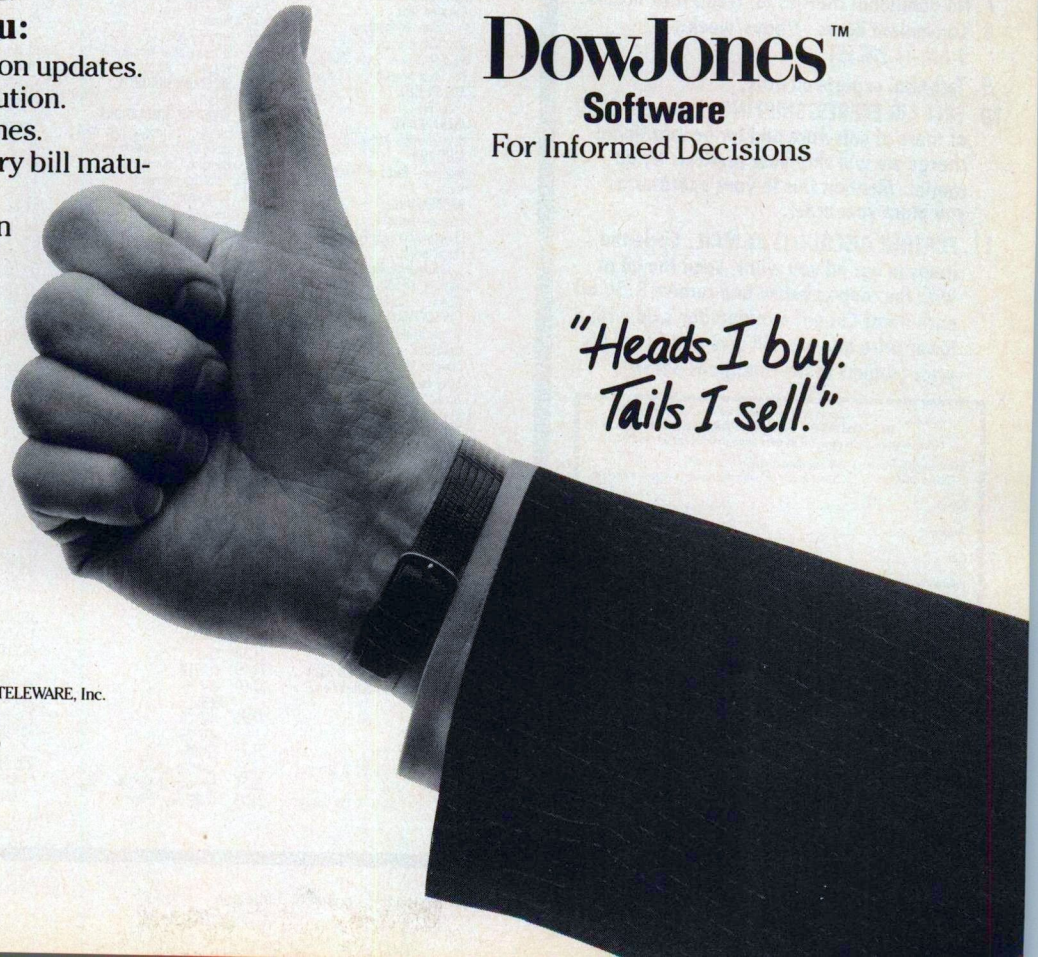

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A COMPUTER LANGUAGE AT THE CROSSROADS

LOGO

Logo is probably the most misunderstood language in the history of programming. The most common impression is that Logo is a language that lets young children make pretty pictures on a computer. Beyond that, Logo is seen as a tool for "discovery-based learning," an educational philosophy that suggests that children learn best by making their own discoveries about the material they are studying.

When you look at Logo's long and illustrious history, you'll see that these perceptions have some basis in fact, even though they are only a small part of the story.

History

Logo came about through the vision of Seymour Papert, an educator who had studied with the famed psychologist Jean Piaget in Geneva. Based on his work there, Papert had become convinced that a powerful way to help children learn was to provide them with tools that let them make discoveries on their own.

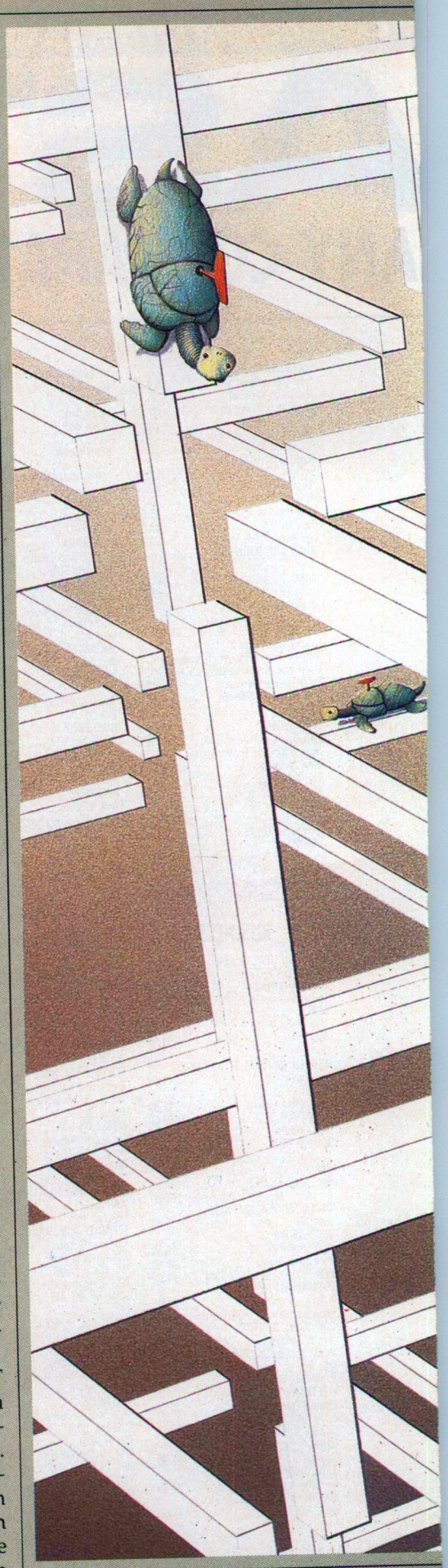
Papert's interest was in getting children to think about problem solving—to think about thinking itself. He realized that one way to achieve this goal was to present children with an artificial "mind" that they could teach things. The computer seemed to be an ideal tool, and the children's act of programming the computer became their act of teaching.

If children were to program computers, the choice of a programming language was critically important.

In Papert's opinion, this language needed to have no floor and no ceiling. A beginner should be able to explore interesting ideas within a few minutes of exposure, and the language should serve the needs of experts as well. To facilitate learning, the language needed to be a general-purpose symbol-manipulation language, applicable to any type of information.

Papert had joined the faculty at MIT in Cambridge, Massachusetts, by the mid-1960s, when these ideas were beginning to take form. The symbol-manipulation language of choice in the Boston area was the artificial-intelligence research language LISP. (In fact, as the second-oldest high-level language after FORTRAN, LISP was virtually the only symbol-manipulation language available.)

LISP was created by Papert's MIT colleague John McCarthy in 1958 as a tool for fundamental research in various aspects of artificial intelligence. LISP programmers tended to be computer experts who were interested in such issues as automatic problem solving, logical reasoning, and the representation of knowledge within a



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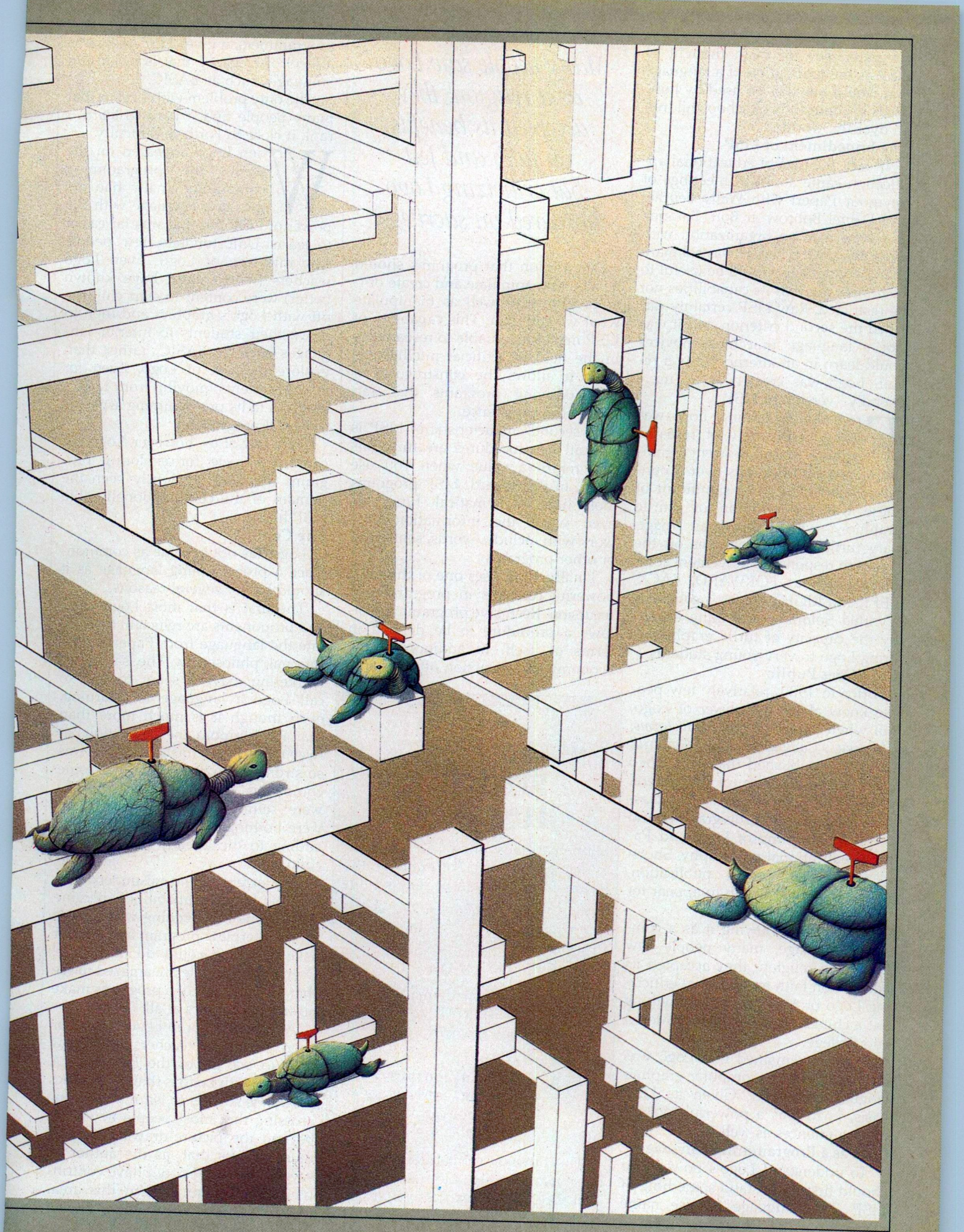

computer. Few of them thought of LISP as the foundation of a language that would one day be used by hundreds of thousands of schoolchildren all over the world.

The Impediment of LISP

In fact, the idea of educational application came about in meetings of Seymour Papert with Wally Feurzig and Daniel Bobrow at Bolt, Baranek and Newman, an organization with close ties to MIT. Papert was adamant that the language should be useful to beginners but that its capabilities not be restricted. Raw LISP certainly satisfied the second criterion, but it was not a language that most novices could learn in an afternoon. As a result, Logo was created as a "user-friendly" version of LISP.

From that beginning, Logo was used in a variety of research projects and underwent significant modifications over a period of years. The most significant of these was the addition of "turtle graphics," which allows an imaginary turtle to draw pictures on the screen in response to movement commands such as FORWARD, BACK, LEFT, and RIGHT. Papert's colleague Cynthia Solomon was quite excited by the capacity of turtle graphics to bring Logo to very young students.

Logo Goes Public

Prior to 1980, relatively few people knew about the power of Logo, but when Papert's book *Mindstorms: Children, Computers and Powerful Ideas* was published that year, Logo came to the attention of the general public. This book emphasized two aspects of Logo: its turtle graphics and the close coupling of Logo and Papert's educational philosophy. Shortly after this book's publication, versions of Logo began to appear for personal computers.

Rather than viewing it as a computer language, many people saw Logo as a religion; they accepted its benefits on faith and felt that criticizing Logo or regarding it as anything but a child's education tool bordered on sacrilege.

The fact remained that Logo was far more than a computer-graphics language, however. Given its LISP basis, Logo was a powerful tool for other audiences as well.

Logo as a Programming Language

To understand Logo's power, you should first understand something of LISP. This language (whose name comes from *List Processing*) is based on the notion that programs should be able to manipulate and create other programs, as well as manipulate what we call data. This capability of LISP makes it valuable to researchers in the field of artificial intelligence, since it allows the construction of self-modifying programs that can learn from experience.

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A second characteristic of LISP is that all its procedures are functions that return a value when you use them. In this regard, LISP programs look like mathematical functions, even when the information they work with includes words, sentences, or other programs.

Finally, LISP uses one of the most powerful concepts in programming: recursion. Recursive programming allows a procedure to be defined in terms of itself. In addition to the economy that recursion often affords programmers, it gives LISP programs a level of elegance that is lacking in languages such as BASIC.

The only problem with LISP is that many people find it hard to learn. I rank it close to Forth in difficulty.

When Logo appeared on the scene, the programming community finally had access to a language with the power of LISP but that was far easier to learn. Unfortunately, few people saw this side of Logo. Even Logo teachers (who should have known better) were content to start children off with Logo's graphics and then to move their students to inferior languages such as BASIC, rather than explore the rest of Logo. Even for young students, moving from Logo's graphics to its programming aspect is a natural progression.

For a few of us, however, Logo became a vehicle for exploring programs that had previously been the domain of the computationally elite LISP hackers.

The Conflict

Logo has not become as commonplace a programming language as it should be, for several reasons.

The first is that most Logo users and proponents are reluctant to separate the language from Papert's educational philosophy. The sales and marketing mavens seem content to call Logo a language for learning, even though it is much more than that. Furthermore, the connection between Logo and turtle graphics was so strong a few years ago that some companies (such as Radio Shack) were selling "Logo" versions that were nothing but graphics packages, adding to the already high level of confusion.

The extent of the misunderstanding of Logo's capabilities became clear to me one evening when I was on an interview program and a caller asked if Logo could do arithmetic! Even today, people are amazed to see that most of my Logo programs make no use of graphics at all.

Another barrier in Logo's path has been the lack of teachers who know how to use all of the language. A problem with Logo is that its graphics portion is so easy to learn and so engrossing that most people never get beyond the picture-drawing stage. I must confess that, as the author of seven books on Logo, I have contributed to the confusion in this area. Only my most recent book, *Beyond*

LOGO
RECURSIVE FUNCTIONS

Mathematicians often use recursion to define functions. For example, the factorial function can be defined this way:

```
FACTORIAL(N) =
{1 ; N=1
{N*FACTORIAL (N-1) ; N 1
```

This recursive mathematical definition of FACTORIAL can be expressed in Logo this way:

```
TO FACTORIAL: N
  IF :N  =  1 {THEN} [OUTPUT 1]
              {ELSE} [OUTPUT :N *
              FACTORIAL :N - 1]
END
```

The obvious similarities between these two representations say a great deal about Logo's expressive power.

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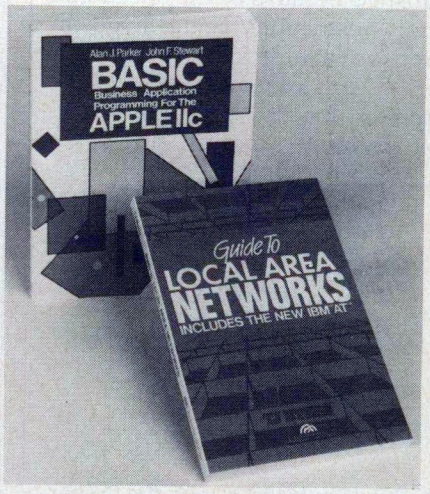

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Turle Graphics, explores the full scope of this language.

People who have used Logo as a programming language often become dissatisfied because of the speed and memory restrictions of the Logo interpreters available for personal computers. For example, the Logo interpreters for the Apple II and Macintosh computers are all slowpokes and memory hogs. Only the Exper-Logo compiler from Expertelligence provides relief in these areas. These limitations need not be as big a problem as some people make them out to be, though. Many professional programmers would give their eyeteeth to have a good interpreter for program development and then have the debugged source code compiled as a commercial product. Because good Logo interpreters and one fairly good compiler are now available, Logo is almost at that stage.

The Logo interpreters for the Apple II and Macintosh computers are all slowpokes and memory hogs.

Another handicap of Logo is that it is not "free." Applesoft BASIC, for all its warts (see "The Learning Curve," *A+*, February 1986 pages 79–80), comes at no extra cost to every purchaser of an Apple II computer. I was delighted when the Macintosh was introduced without a built-in language—users finally had freedom of choice!—but the parasitical entrenchment of BASIC has become so pervasive that I doubt anything can blow it out of our computers anymore.

Not that no one has tried.

An Experiment

To show that Logo had a lot to offer serious programmers, I taught a Logo course to graduate students in design at Stanford University for one quarter last year. The course's function was to explore computational tools that help foster the creative process. My students used the Exper-Logo compiler on the Macintosh, and the results were spectacular.

For example, one class participant, Young Harvill, created a program that constructed a screen representation of a three-dimensional object created by rotational sweeping. Users of this program get three graphic windows, one of which allows the creation of a cross-sectional shape for the object across the axis of rotation. Another of the windows lets you create a cross-sectional view along this axis. Once the program has drawn these shapes, a 3-D representation of the object appears in the third window. This third image comprises dot patterns that represent the brightness of the light reflected from the final surface, based on the gradient of each point on the surface relative to the location of the light source. The resultant picture is nearly photographic in quality (see figure 1).

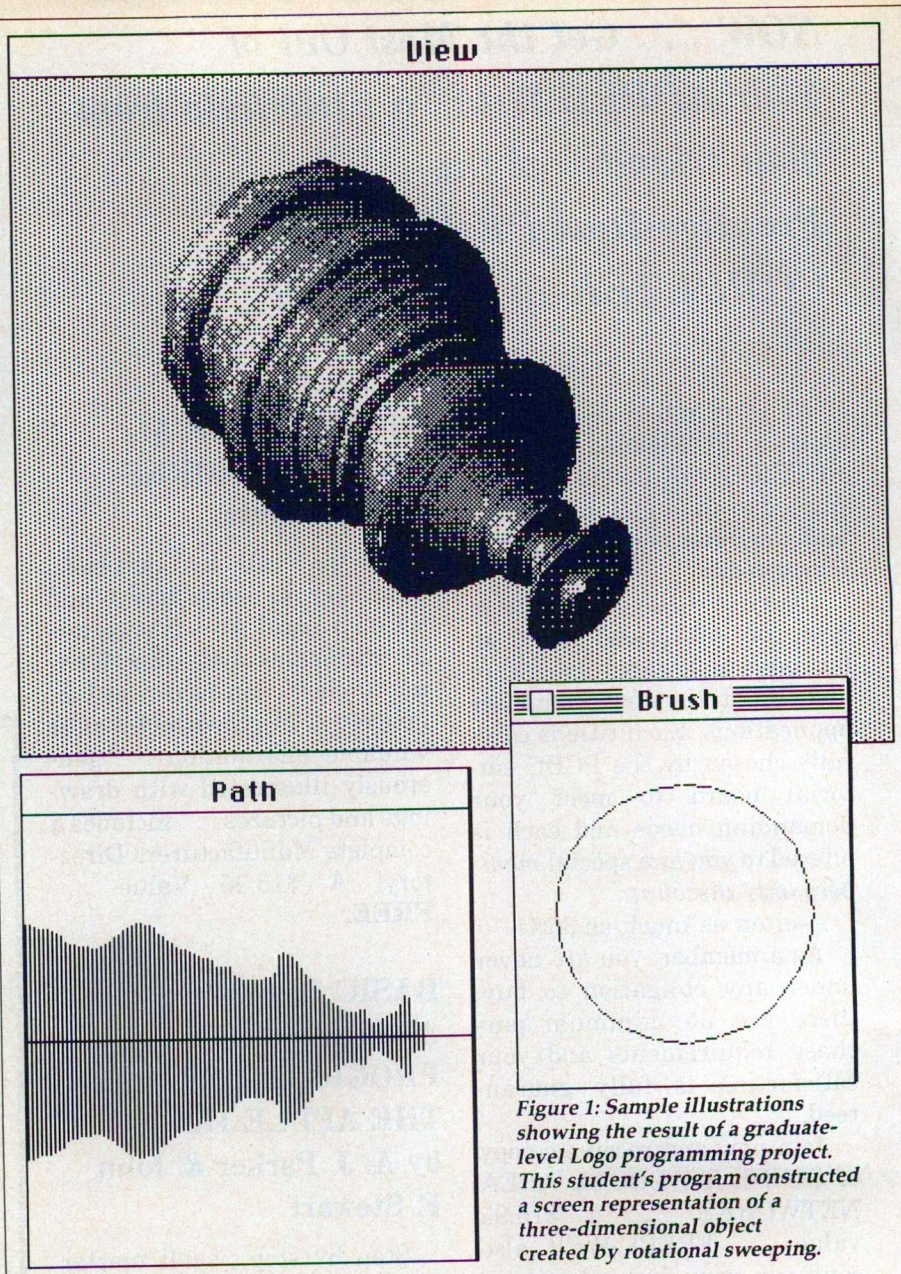

Figure 1: Sample illustrations showing the result of a graduate-level Logo programming project. This student's program constructed a screen representation of a three-dimensional object created by rotational sweeping.

This program is about 20,000 bytes long—not the sort of program you'd expect from a third-grader. The author of the program had tried to do this task with several other languages and had given up in despair, but Logo met his needs quite well. Other students in this course had equally impressive projects, and some of them are now in the final stages of commercial development. These students' experience with Logo showed them a power in programming that they didn't know existed.

People who have become proficient Logo programmers have subsequently had an easy time learning other languages such as LISP, PROLOG, Neon, and Forth. If this educational effect were Logo's only benefit, it would be worth learning!

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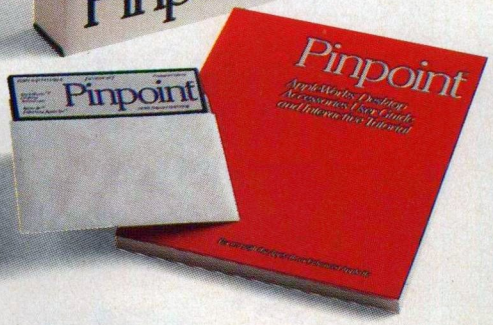

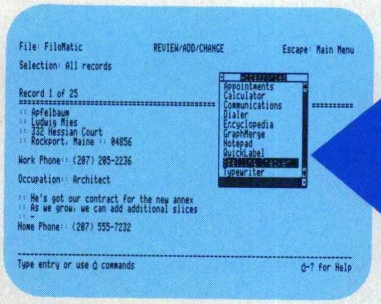

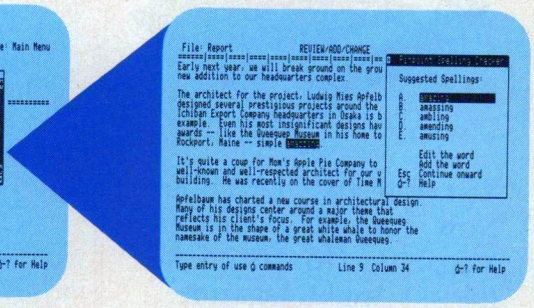

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available for you. Logo is at the crossroads. It can remain forever in the private domain of schoolchildren, or it can be a springboard for creativity in programmers of all ages and skill levels. The choice is up to you. +

Dr. David Thornburg has been active in the field of personal computers since 1978. He is the inventor of the KoalaPad touch tablet and principal designer of Muppet Learning Keys. He has written more than ten books on computing.

LOGO

RESOURCES & REFERENCES

The community of Logo programmers is quite active. Two of the more popular organizations that publish newsletters in this country are

The National Logo Exchange
P.O. Box 5341
Charlottesville, VA 22905

Young People's Logo Association
P.O. Box 855067
Richardson, TX 75085

I recommend the following books for those who are interested in learning more about Logo. Of the many books on the market, these are among the more significant, in my view. To my many friends whose books I haven't listed here, may you take comfort in the fact that I have left most of mine off this list as well.

Abelson, Hal. *Logo for the Apple II*. Byte/McGraw-Hill, 1982.

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Bundy, Alan, ed. *Artificial Intelligence: An Introductory Course*. North Holland, 1978.

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Thornburg, David. *Discovering Apple Logo: An Invitation to the Art and Pattern of Nature*. Addison-Wesley, 1983.

_____. *Beyond Turtle Graphics: Further Explorations of Logo*. Addison-Wesley, 1986.

Watt, Dan. *Learning with Logo*. McGraw-Hill, 1983.

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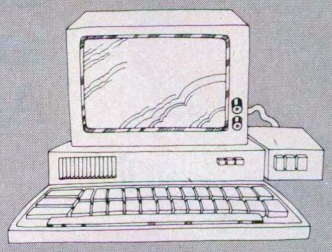

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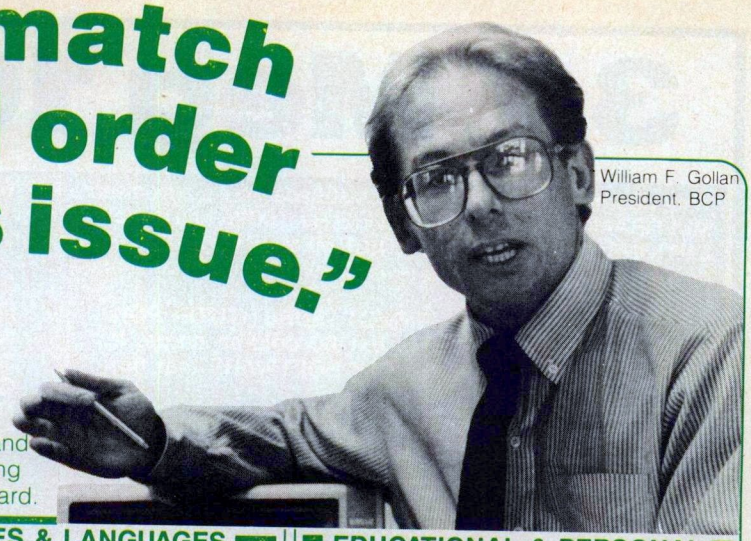

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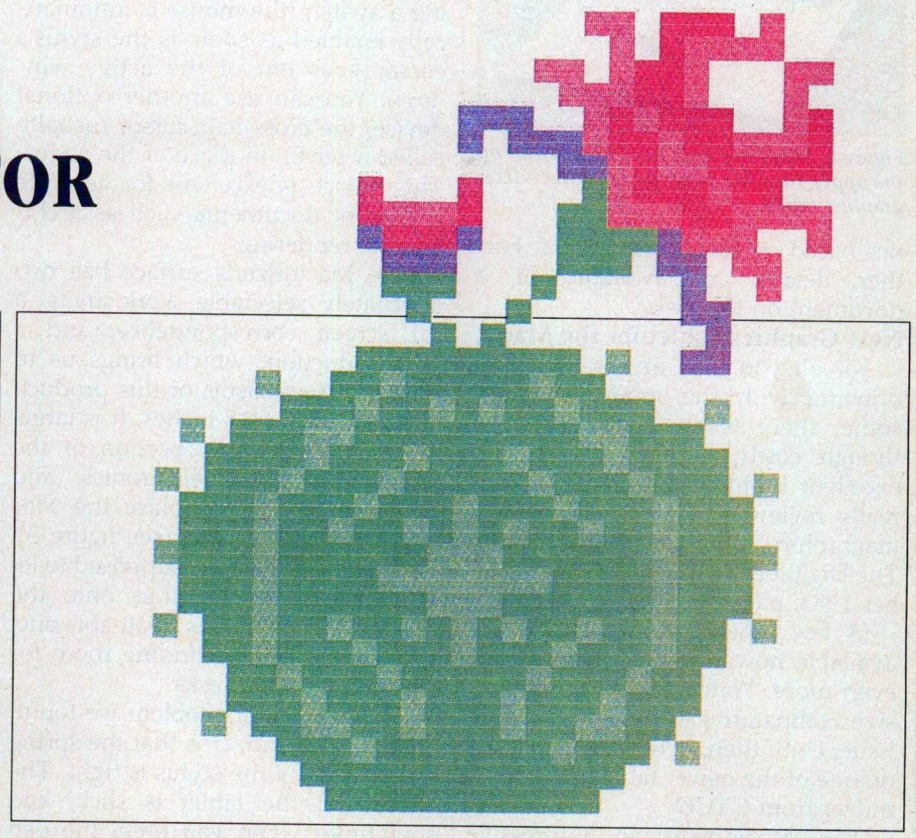
BY ROBERTA SCHWARTZ AND MICHAEL CALLERY

SOMETHING FOR EVERYONE

From printing low-res graphics to using two graphics-oriented computer languages



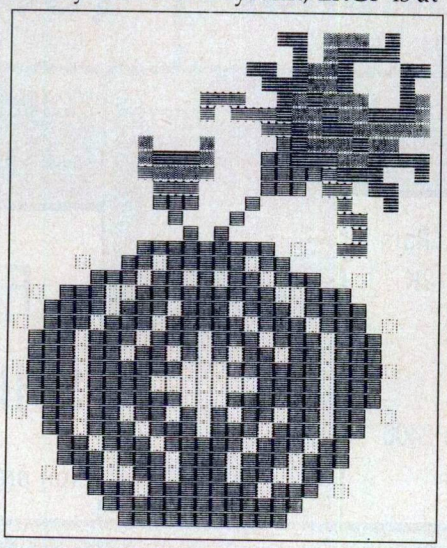
This month we bring you another something-for-everyone column, including new products, upgrades, and an introduction to two graphics-oriented computer languages.

Printing Apple Low-Res Graphics

In our November 1985 column, we talked about hi-res and double-hi-res color-printing options. At the time, we weren't aware of any commercial print utility that could dump the Apple II's low-resolution screen. Now we know of one, thanks to Gerald Berkowitz of Burke Software, who sent us a copy of his company's Low Resolution Graphic Plotter.

This program works so well and is so easy to use that we searched through all our disks and printed every low-res picture we had. Low Resolution Graphic Plotter works with several color printers such as the Apple ImageWriter II, the Epson JX80, and the Transtar 315, as well as a full range of black-and-white printers (see figures 1 and 2).

To print your graphics, you simply boot the program and indicate which printer you're using. If you select a black-and-white printer, the program asks you which one of two pattern sets you want for your printouts. Once the program is loaded into memory, you remove the Low Resolution Graphic Plotter (LRGP) disk from the drive, insert your own disk, and either BLOAD a low-res graphic or run a program that creates one. When your graphic is on the screen, a press of the ampersand (&) key calls the LRGP, and your picture is printed. Until you boot the system, LRGP is at your beck and call, and you can print one graphic after another.



Figures 1 and 2: Low Resolution Graphic Plotter prints low-res graphics in color (top) and in black and white (above).

This program is a definite must for anyone who works with low-resolution graphics. Parents and teachers will surely appreciate the ease with which children of any age can print their low-res creations in black and white or color.

Update: Fontastic

Fontastic for the Macintosh is an excellent font mover and editor from Altsys (see "From London to Cairo," *A+*, December 1985, pages 187–194). We've just received Version 2.4, which has many enhancements and corrects some bugs reported by users of the earlier versions. In addition, a User's Guide addendum clarifies how to adjust ascent, descent, leading, kerning, and letter spacing.

To meet the demand for specialized fonts, Altsys will begin limited distribution of fonts made by Fontastic users. Send your creations. If your font is accepted, you'll receive royal-

CACTUS FLOWER' BY ROBERTA SCHWARTZ

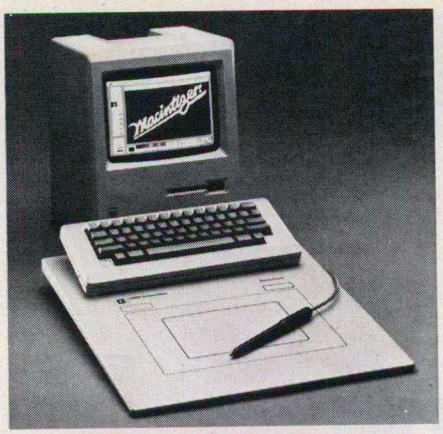


Figure 3: The Macintosh keyboard can sit on the upper, inactive, portion of the Macintizer graphics tablet.

ties based on sales of the fonts. Further details are available in a document on the disk.

New Graphics Tablet for the Mac

For all you Mac artists who find drawing with the mouse cumbersome, there is an alternative. Although costly, graphics tablets are excellent input devices. *A+* has already reviewed, in depth, the Summagraphics tablet (see "MacTablet, The Digital Drawing Board," September 1985, pages 144–148).

A few other graphics tablets are available now, and we expect to see even more. Watch for a comprehensive comparative review in a future issue. Until then, here's the lowdown on one of the newer tablets, the Macintizer from GTCO.

The Macintizer, an impressive electromagnetic digitizer, doesn't use special software. The tablet plugs into the mouse port, so the pen-shaped stylus reads as accurately as does the mouse, all Mac software is compatible with it, and you don't have to sacrifice one of the Mac's serial ports to use it. An optional mouse cable allows you to plug your mouse into the tablet and alternate between stylus and mouse without so much as flicking a switch (the mouse is automatically enabled as soon as the stylus's cursor goes out of the active window). You can use another optional device, the cross-hair cursor (usually called a puck), in place of the stylus. This device is excellent for accurate tracing of documents such as architectural renderings.

The Macintizer's surface has two alternately selectable work areas, a 1:1 screen correspondence, and a 33% reduction, which brings us to one of our criticisms of this product: its size—15.5 × 18 inches. It is large! The upper, inactive, portion of the tablet houses the electronics, and GTCO suggests you place the Mac keyboard on this area (see figure 3). The large tablet size is supposed to let you trace large drawings onto the Mac. This capability is a valuable one, but we had trouble finding room for the tablet on our desks.

The only other problem we found with the Macintizer is that the spring mechanism of the stylus is tight. The surface of the tablet is slick, and sometimes when you press the pen down for input, it slips a bit before the spring releases the pen tip, which results in an errant pixel or two. This problem becomes a bigger one when you make a menu selection—the pen frequently slips down to another menu choice. Although the Macintizer is expensive, we found it excellent in quality, ease of use, and accuracy. If you have the space for it, we recommend it.

At Your Request: Logo

We've received letters asking for information about Logo and turtle graphics, so here goes.

Logo was developed at the Massachusetts Institute of Technology specifically to teach children about computers and math. Today it's one of the most sophisticated interactive computer languages (see "Logo: A Computer Language at the Crossroads" preceding our column this month). Graphics are essential to Logo, and an important part of learning to program in Logo is learning to draw with the tools of the language. No other general-purpose computer language has so thoroughly embraced graphics. Because Logo was developed to be simple enough for kids, it's a great way for us older folks to learn about programming graphics.

In Logo, the drawing tool is called a turtle. The turtle, a tiny triangle on the screen, represents a robot holding a pen. You create graphic images by ordering the turtle around the screen with commands such as FORWARD 10 (steps), RIGHT 30 (degrees), FORWARD 50 (steps), and so on. As the

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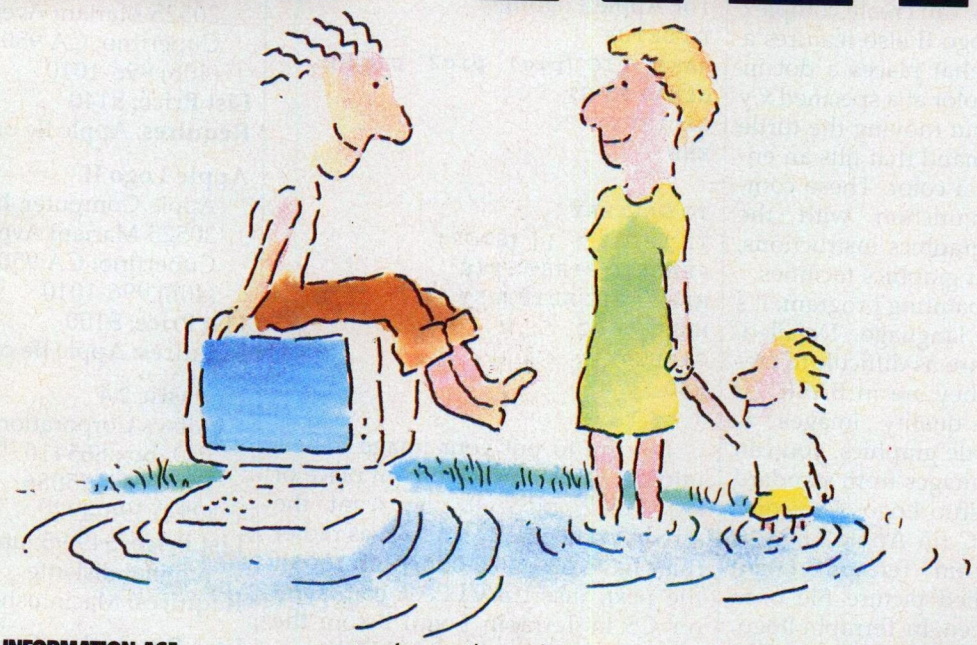

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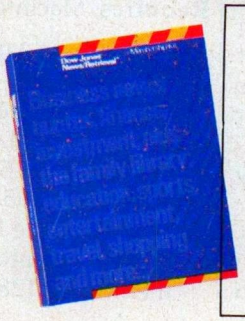

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turtle "walks," it draws—unless you instruct it to hold its pen up. Although first developed for Logo, turtle graphics is now present in other computer languages, including Apple Pascal.

The center position of the Logo screen, in Cartesian terms, is 0,0, with the screen divided into +x, +y; +x, −y; −x, +y; and −x, −y quadrants. You can direct the turtle to go instantly to any point on the screen with the instructions SETX, SETY, SETXY (Terrapin Logo), or SETPOS (Apple Logo II). If the turtle's pen is down, it will draw a line to the specified point. A few simple Logo subroutines, called procedures, can create complex images. Apple Logo II also features a DOT command that places a dot in the current pen color at a specified x,y coordinate without moving the turtle and a FILL command that fills an enclosed area with a color. These commands, in conjunction with the standard turtle-graphics instructions, provide powerful graphics facilities.

Logo is not a painting program; it's a programming language. Detailed, realistic images are as difficult to create in Logo as they are in BASIC. If you need high-quality images as backdrops to turtle graphics, you can bring full-page images from standard paint programs into Logo. The commands READPIC (in Apple Logo II) or LOADPICT (in Terrapin Logo) bring the specified picture file onto the graphics screen. In Terrapin Logo, the pictures must have the suffix .PICT for LOADPICT to recognize them. Because Apple Logo II is ProDOS-based, you may have to convert files from DOS 3.3 unless you're using a ProDOS paint program. Dazzle Draw images won't work, since neither version of Logo works with double-hi-res graphics.

Once you've loaded an image, the turtle can draw on top of it. One use for this option is to provide colorful mazes through which children can drive the turtle as they learn the basic turtle-graphics vocabulary.

Logo graphics are standard 8K images, and you can save them to disk. The commands SAVEPIC (in Apple Logo II) or SAVEPICT (in Terrapin Logo) will do the trick. Then you can enhance these screens in a paint program. When the final images are created, a BASIC gallery program (such as The Graphics Department, which we presented in our May 1985 column) or the following Logo programs can show the pictures sequentially:

For Terrapin Logo:

```
TO SETUP
MAKE "PIC [pic1  pic2  pic3]
DRAW FULLSCREEN HIDETURTLE
GALLERY
END

TO GALLERY
IF :PIC  =  [] STOP
READPICT FIRST :PIC
MAKE "PIC BUTFIRST :PIC
MAKE "T RC
GALLERY
END
```

For Apple Logo II:

```
TO SETUP
MAKE "PIC [pic1  pic2  pic3]
CLEAR FS HT
GALLERY
END

TO GALLERY
IF :PIC  =  [] [STOP]
READPIC FIRST :PIC
MAKE "PIC BUTFIRST :PIC
MAKE "T RC
GALLERY
END
```

Be sure to put your image names into the SETUP procedure in place of pic1 pic2 pic3. If you want the screen to clear between images rather than have one image load on top of the next, insert a CLEAR command (or CS in Terrapin Logo) before the word GALLERY in the GALLERY procedure. If, instead of a key press, you'd rather have a pause between pictures, change the MAKE "T RC to WAIT 100 in Apple Logo II and REPEAT 1000 () in Terrapin Logo. The larger the number, the longer the pause.

Apple II Instant Pascal

Apple II Instant Pascal was released last fall with little fanfare. We're impressed with it. This is an interactive Pascal that is compatible with Macintosh Pascal, and it includes a Macintosh-style user interface: windows, menus, and mice. Apple II Instant Pascal lacks the Mac Toolbox calls that make Macintosh Pascal such fun, but in their place it has double-hi-res graphics. This is the first programming language for the Apple II that fully supports double hi-res. You specify the colors by using a PENPAT procedure. The fundamental drawing tools are points, circles, rectangles, and lines. You can put text in the graphics window with DRAWCHAR or DRAWSTRING.

Like Macintosh Pascal programs, Apple II Instant Pascal programs cannot run outside of the Pascal interpreter, so you can't use it to create stand-alone programs. As a tool that teaches people who are interested in graphics about programming and Pascal, it is unexcelled, however.

Look for an in-depth review of Apple II Instant Pascal in an upcoming issue of *A+*. ✚

PRODUCT INFORMATION

Apple II Instant Pascal
Apple Computer, Inc.
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Cupertino, CA 95014
(408) 996-1010
List Price: $140
Requires: Apple IIe or IIc, 128K RAM

Apple Logo II
Apple Computer, Inc.
20525 Mariani Avenue
Cupertino, CA 95014
(408) 996-1010
List Price: $100
Requires: Apple IIe or IIc, 128K RAM

Fontastic 2.4
Altsys Corporation
P.O. Box 865410
Plano, TX 75086
(214) 596-4970
List Price: $49.95; upgrade, $8 plus original diskette
Requires: Macintosh

Low Resolution Graphic Plotter
Burke Software
P.O. Box 515
Park Ridge, IL 60068
(312) 823-1357
List Price: $39.95
Requires: Apple II Plus, IIe, or IIc; DOS 3.3 (specify your printer and interface make and model)

Macintizer
GTCO Corporation
1055 First Street
Rockville, MD 20850
(301) 279-9550
List Price: $599
Requires: Macintosh

Terrapin Logo 3.0
Terrapin, Inc.
222 Third Street
Cambridge, MA 02142
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List Price: $99.95
Requires: Apple II, II Plus, IIe, or IIc; 64K RAM (automatically uses extra memory in 128K Apple IIe or IIc)

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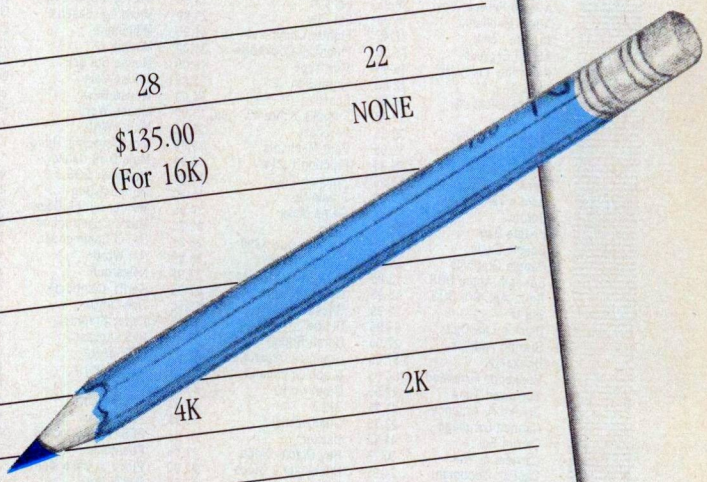

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CIRCLE 231 ON READER SERVICE CARD

BY DAVID D. THORNBURG

WHAT'S TURNING TEACHERS INTO THIEVES?

Illicit software copying—underfunding causes nationwide crime spree

Our local newspaper recently ran an article on page 1 about a junkie who held up a liquor store at gunpoint. The store owner handed over all the cash in his register—about $80. The robber fled with the money, a jar of beef jerky, and a six-pack of beer.

That same day, a schoolteacher in the same town made a copy of AppleWorks to give to a friend who taught at another school. His theft did not make the papers—probably because he forgot to steal the beef jerky and the beer.

Whether it is some drug-addled crackpot who walks into a store with a Saturday-night special or a schoolteacher who rips off a piece of commercial software, theft is theft, and the time has come to stop putting up with it.

Of course, the junkie has an excuse—he needs the money to support a habit. Without a fix, he might die. The teacher has an excuse as well. Software is expensive, and budgets are tight. Besides, it is the children who benefit from this theft.

Quite frankly, I feel more pity for the junkie than I do for the teacher who steals.

Educational-software houses are dropping like flies, and many of the ones that are still in business are on the ragged edge of success. Software theft has reached epidemic proportions in this country, and unless something is done about it, the developers of educational software will move into another business in which they won't get robbed blind.

Stealing the Best

A funny aspect of software theft is that no one steals mediocre software. The really good titles are the ones that are ripped off left and right. I recently visited the campus of a major university that belongs to the Macintosh Consortium. There must be several thousand Macs on that campus—all paid for. One of the reasons I spoke at that campus was because many people there shared my interest in Filevision from Telos. Although there were probably hundreds of copies of Filevision on that campus, I was told that fewer than a dozen copies had been purchased. Talk about a front-page story!

Teachers should be discouraged from thievery because they believe it to be wrong, not because it's difficult.

The Right to Copy

I am a staunch defender of people's right to make copies of software for their own use. I, for one, refuse to become dependent on a piece of software I can't back up myself. The manufacturer's offer of backup disks doesn't help me when the program disk blows up on a Friday afternoon after the company's office is closed. As a result, I have a collection of "lock picks" with which I (and just about everyone else, it seems) can undo the copy protection the vendors use to cut down on illicit copying.

The argument for better copy protection is that it discourages theft. Nonsense! It may discourage casual thieves, but I don't know of any piece of code that can't be copied. For example, if I am frustrated by the copy protection on an Apple II disk, I just boot it on my modified IIe that lets me save the bit image in RAM to the

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disk directly. It may take a while to copy all the files, but I then have a backup copy that is not protected.

I agree that the simplicity of disk copying makes it easier for people to be thieves, but this ease is no excuse for people who consider themselves civilized. People—especially teachers—should be discouraged from thievery because they believe it to be wrong, not because they believe it to be hard.

The renunciation of illicit disk copying may be too much to ask of the public at large, but I am ashamed to think that it may be too much to ask of teachers.

The Robin Hood Syndrome

Teachers are proud of their frugality, and rightly so. Their sharing of resources among each other is well known. I have seen many teachers reach into their own pockets to purchase materials for their students' use, knowing full well that they won't be reimbursed. But some teachers leap through hoops of hypocrisy to justify their theft of software.

"We share dittos, why shouldn't we share programs?"

"I'd pay for the software myself if it were reasonably priced."

"I'm just using it for one child."

"Our budget allowed us to set up a computer lab but didn't have enough money for software."

"We have a lab full of computers. Surely I shouldn't have to buy extra copies of the same program for each one."

Are these compelling arguments? Let's see.

Sharing dittos is different from sharing commercial software. If teachers want to share materials they've created themselves, that is fine. The same goes for software that authors have placed in the public domain. I don't recall anyone at The Learning Company, Scholastic, or Sunburst agreeing to the free distribution of their software, however.

Help Lower Prices

I'll admit that the pricing of software is an issue. The effort that goes into creating a good piece of software is about the same as what's required to write a book. We are used to buying books for $10–$20 and balk at paying $40–$60 for a piece of software. The price discrepancy has to do with the size of the respective markets. A book publisher reaches a large audience and may be willing to set a break-even point at 25,000 copies. The educational-software publisher, on the other hand, has a much smaller market and needs to recover development costs from a much smaller volume—5000 copies or less.

If all commercial software were purchased, instead of a lot of it being stolen, software publishers could lower their prices—and probably would, just to reach a larger market.

Check It Out

The issue of one child's use of special software for a short time is an important one. Schools already deal with this situation in the realm of print material through the library. I see nothing wrong with a library's checking out software as students require it.

Get the Money

The issue of low school budgets is always with us. Teachers are not paid nearly enough for their work, and budgets for supplies are pitifully low in many schools. Rather than accept this underfunding complacently—and "helping the budget" through stealing—teachers should make sure parents know that their school doesn't have the financial resources to expose their children to the experiences they should have. The solution is more money for schools, not illegal copying of software.

Should a school with 20 computers have to buy 20 copies of each program that will be used on all the computers at once? Of course! After all, each child has his own textbook. A class with 31 children has 31 math books, 31 English books, and so on. The major suppliers of educational software are even offering "lab packs," multiple copies of one program at a special price.

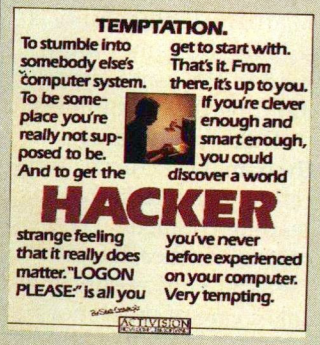
Know Your Victim

I know that teachers don't want to be thieves and that they really do have their students' interests at heart. But everyone who makes an illegal copy of a commercial program should know that this theft will hurt the income of a real human being who worked his or her heart out to design the very best program possible. Teachers who steal software aren't stealing from a faceless corporation; they are stealing from a flesh-and-blood person who has dreams and desires for a happy life. These dreams get shattered each time a copy of a program is stolen.

At least the junkie with the gun had the courage to look his victim in the face. ✚

CIRCLE 306 ON READER SERVICE CARD

That's Entertainment



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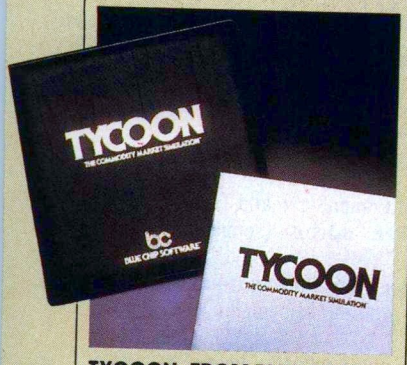


TYCOON, FROM BLUE CHIP SOFTWARE

GET THEE BEHIND ME, SATAN

Remember the catch phrase "Read the book—see the movie"? Well, hold the presses, and amend that to "Read the book—play the computer game." As part of its "Living Literature" series, Bantam Electronic Publishing's computer game I, Damiano: The Wizard of Partestrada is based on the popular fantasy trilogy (*Damiano, Damiano's Lute,* and *Raphael*) by R.A. MacAvoy.

Games taken from stories first published in other media seem to be an industry-wide trend. There are now adventure games based on such classic tales as *Alice in Wonderland, Treasure Island,* and *The Wizard of Oz,* as well as games derived from the more recent *The Hitchhiker's Guide to the Galaxy* and *Below the Root* (from the Green-Sky trilogy).

Not having been previously familiar with I, Damiano's source material, I found the premise of this particular story intriguing. Set in 14th-century Europe, the game has you assume the role of Damiano Delstrego, warlock, music student of the Archangel Raphael, and enemy of Satan. You have two main quests: to save your beloved city of Partestrada from the occupation of the wicked General Pardo and to find a Sacred Stone containing the secret of life. While doing these things, you have the equally important goal of resisting Satan's entreaties.

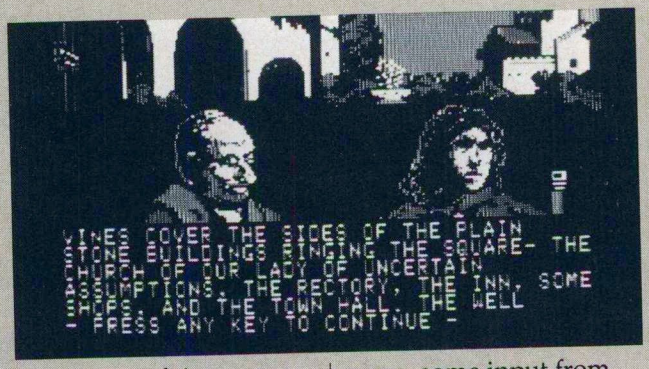
Damiano can cast powerful spells, for both good and evil purposes. If Damiano's evil nature becomes too great, Satan claims his soul, which ends the game. Damiano's traveling companion is his dog, Macchiata, who narrates the action. (I told you this was a fantasy!) As a small boon to novice adventurers—or even experienced players who are tired of second-guessing adventure-game creators—Macchiata often prods Damiano into the correct course of action.

I, DAMIANO, FROM BANTAM ELECTRONIC PUBLISHING

That's Entertainment

The screen format has a refreshing look. The lower half contains the text, and, to illustrate the action, the upper half shows high-resolution pictures with some primitive animation. I, Damiano also has a unique way of measuring the hero's progress. Eschewing the usual scoring or point system, a bar line extends across the middle of the screen, constantly updating Damiano's good/evil rating. Unlike other games with which you may be familiar, I, Damiano has no object manipulation to be concerned with—you cannot even use the standard adventure-game term *inventory*.

Now here's the rub: There's nothing wrong, per se, with transforming



a literary work into a computer game. But, over the last few years, the adventure game as a genre has evolved and been refined to a fairly sophisticated point. Even though all games have a linear plot, their internal design must be flexible enough to accommodate almost anything you can type at any given place. In addition to furthering serious attempts to complete the game, some input from you may trigger humorous responses from the computer, and some may lead you into cul-de-sacs of varying length and complexity. In pursuing some of the dead ends, you can also encounter clues on how to proceed correctly the next time through.

I, Damiano does contain some of these crucial elements, but—and this is not a fault it shares with some of the other story-games I've mentioned—I, Damiano's plot is *too* linear, *too* constricting for an adventure-game format. For example, you don't need to map your surroundings, since the game usually has only one response per prompt that propels the action, triggering a change of scene. If you don't choose the correct phrase, the game ends, and you have to start again. So, instead of feeling that your ingenuity is solving the game, you tend to feel as if you are painting by the numbers.

Further, the game's authors make a crucial story-telling mistake in that the leading character, Damiano, neither defeats General Pardo—a plague takes care of that—nor

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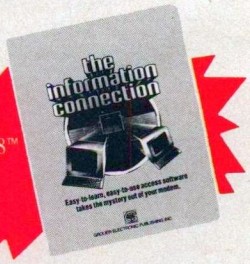

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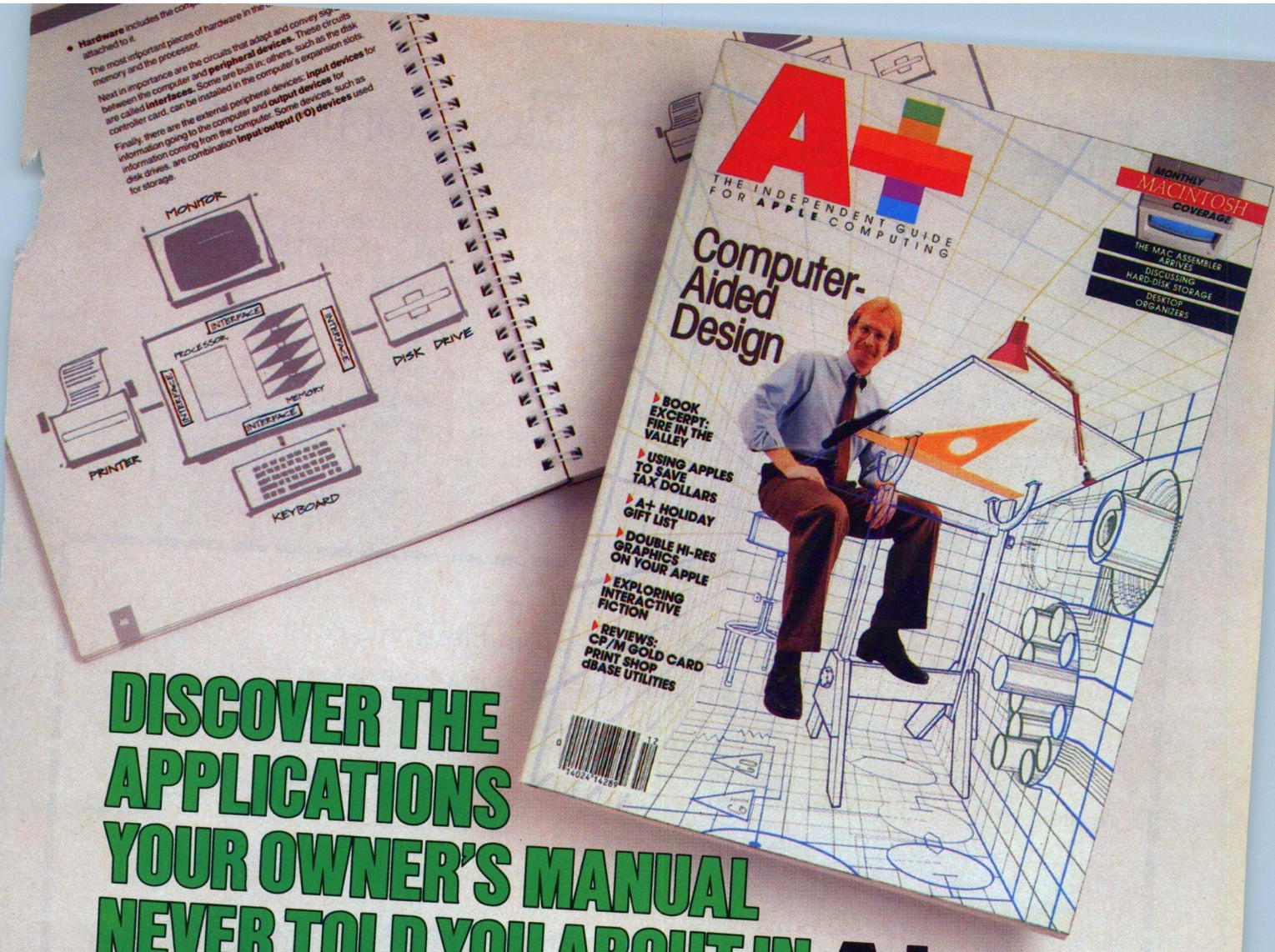

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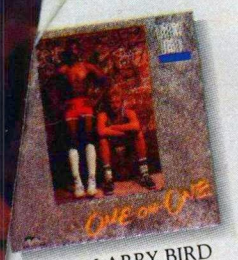

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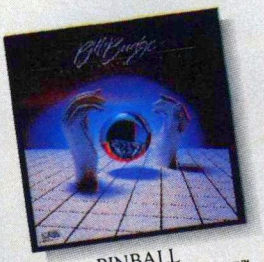

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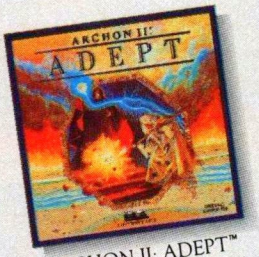

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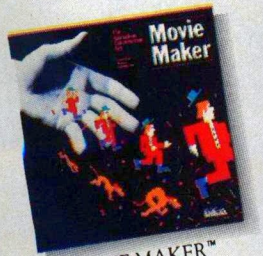

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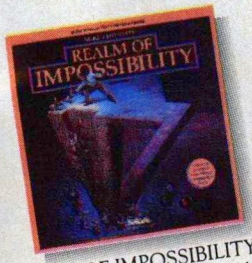

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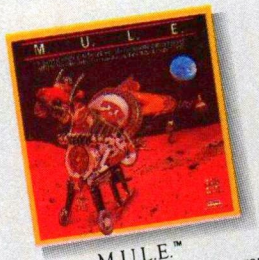

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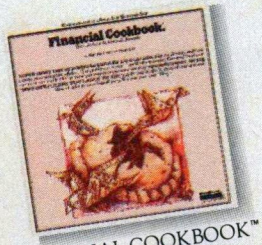

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CIRCLE

does he even vanquish Satan (I won't give away how that happens).

None of the above criticisms would be of the slightest significance if I, Damiano were a satisfying game unto itself, but, alas, for me, it wasn't. If you happen to be interested in the Damiano saga, you'd be better off buying the books—they're cheaper, too.

Donald Oliver

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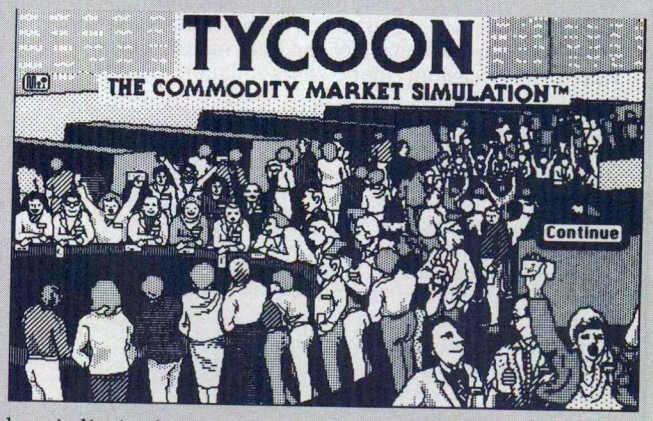

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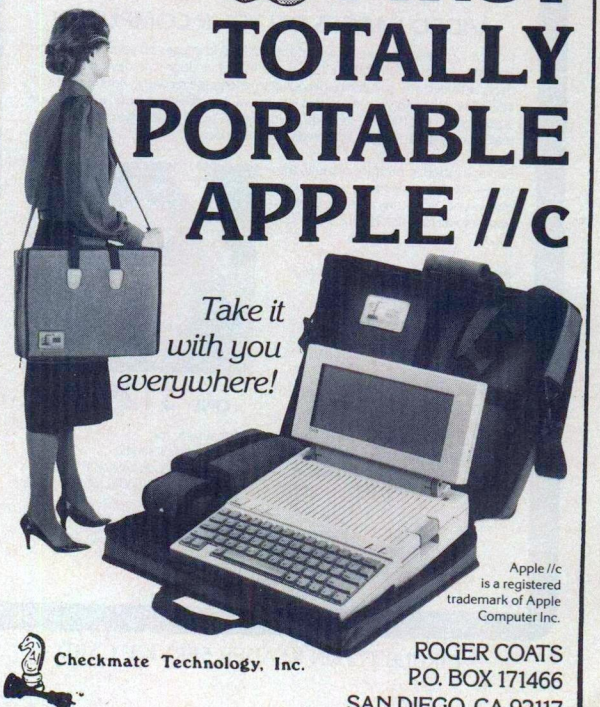

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- Atari 800/800XL/65XE/130XE

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CIRCLE 172 ON READER SERVICE CARD

That's Entertainment

these sophisticated analysis tools but doesn't take the time to explain how to interpret them accurately.

The object is simple: make a million. You have one year in which to achieve this goal after you start with $10,000. When you begin, you are considered a greenhorn, a novice. To protect you from yourself, the game allows you only to be long (own a commodity) and limits you to only eight types. As you sit and dream, Tycoon holds carrots in front of you: agricultural commodities such as soybeans, wheat, orange juice, coffee, pork, beef, and cocoa are yours for the asking (you have to pay for them, of course). If you prefer hard goods, what about lumber and oil, or financial instruments such as silver, gold, the Standard & Poors 500 stock index, treasury bills, Swiss francs, and the Japanese yen?

By margining (borrowing some of your capital for an investment), you can control hundreds, if not thousands, of dollars' worth of goods or financial instruments. The higher your rank in the game, the lower your margin requirement—the old-boy effect.

If your skill is as big as your eyes, you will start to make money and will rise to investor status after your first $5000 profit. When you are an investor, you can trade all 15 commodities listed. When you double your investor's bankroll ($30,000), you are considered a speculator and can short (sell) commodities. As a novice and investor, you can make money only when the market goes up. When you can short, however, you can make money when the market falls. There is nothing quite like gloating over a $20,000 profit from a market drop that made a competitor lose his shirt, home, and car.

Within the year, prices change 14 times, giving you 14 shots to make your fortune. As in all of the Blue Chip games, you have constant access to financial and economic information as well as technical charts. Up to 14 people can play—and lose.

The object is simple: make a million. You have one year in which to achieve this goal.

Tycoon is an excellent learning tool for any investor over 12 years old with $49.95 (the price of the software). Once you play Tycoon, you'll know whether you want to learn more about commodities or if savings bonds are more your style. It's close enough to real life that you will probably stash some money under the bed in case you lose your shirt in the market.

Ken Landis

Tycoon
Blue Chip Software
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(818) 346-0730
List Price: $49.95
Requires: Macintosh

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JE868 (Expand-A-RAM) . . . $119.95

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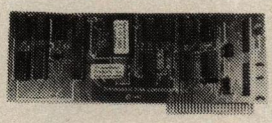

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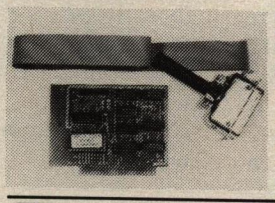

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ADD-514 (Disk Drive) $139.95
JE875 (Controller Card) $49.95

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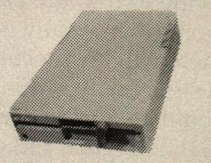


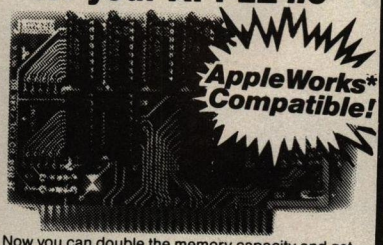
- Direct drive • 143K formatted • 35 tracks • Super quiet • Works with Apple Controllers or other compatibles (JE875) above • Complete with connector-just plug into your controller • Size: 5¾"W x 1⅝"H x 8"D • Weight: 4 lbs.

ADD-12. . . . $129.95

APPLE™ *IIc* Compatible 5¼" Half-Ht. Disk Drive
- Same specs as ADD-12 (above) except no controller necessary.

ADD-IIc. . . . $129.95

80-Col. plus 64K RAM for your APPLE *IIe**



Now you can double the memory capacity and get an 80-column display format for your APPLE *IIe** computer at an affordable price. Just plug the JE864 card into your APPLE* and expand your display to 80 characters per line. Perfect for word processing. The JE864 also features 64K bytes of additional memory to allow programming not possible with standard APPLE *IIe** computers. Complete documentation included.

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Part No.	Description	Price
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**When using CP/M, the JE860 and JE868 will only function with Version 2.20 or earlier; PASCAL (JE868) Version 1.1 or earlier.

CIRCLE 279 ON READER SERVICE CARD

That's Entertainment

WHY AM I PLAYING THIS GAME?

DO NOT READ THIS REVIEW!—if you are already sure that you want to play Hacker, Activision's new adventure game for the Macintosh. The less you know about Hacker going in, the better. The game comes with almost no documentation, so if you're already sure that you want to play Hacker, don't read past this paragraph.

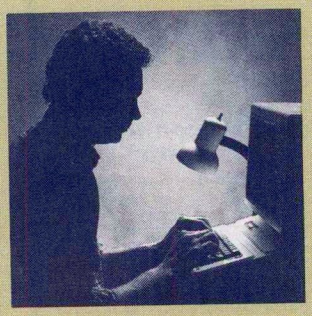
Hacker begins simply with the words LOGON PLEASE:. After you spend some frustrating moments trying to find the password (there really is one), there will be a security-system malfunction, and you'll be dumped on-line to the Magma, Ltd., computer system.

Next you encounter a few small additional puzzles, still not knowing the object of the game. Judging by the title and from what you have seen so far, you may guess that Hacker is a game based on telecommunications—hacking, or breaking into computer systems—but, in fact, it is a spy adventure. It seems that a network of international spies has stolen the shredded parts of a secret document. Your job is to track down these spies and obtain all the pieces of the missing document.

Do not read this review if you are already sure that you want to play Hacker.

To make things even more complicated, you can't go in person. You must guide your SRU (Subterranean Remote Unit), a well-equipped robot, through a series of interconnecting tunnels that traverse the planet, surfacing at key points to summon the spies.

Hacker involves mapping the tunnels (very important), trading with spies, and putting up with increasingly serious glitches in your link to the SRU. You must purchase items from the spies and then determine what item each spy will accept in



trade for his piece of the document. A nice touch is that each spy speaks in his native language (with key words interspersed in English). You can learn a little French, Chinese, Hindi, and more. Oh, and did I mention the security robots that keep stopping you? They'll end the game in a hurry if you can't answer their questions.

Hacker is visually pleasing. The main screen displays a world map,

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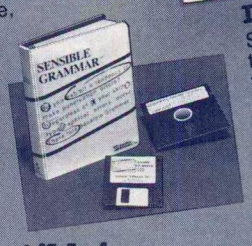

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*Sensible Grammar and Sensible Speller ProDOS work with the following word processors, AppleWorks, AppleWriter-ProDOS version (Apple Computer, Inc.); Format II Enhanced-ProDOS (Kensington Microware). Mouse Write (Roger Wagner Publishing); Word Juggler (Quark Inc.); Zardax-ProDOS (Computer Solutions) and others. **Sensible Speller ProDOS** also works with PFS:WRITE-ProDOS (Software Publishing, Inc.); Mouse Word (International Solutions); Word-Talk (Computer Aide) and WordPerfect (SSI Software). **Sensible Speller IV** works with DOS 3.2 and DOS 3.3-AppleWriter (Apple Computers, Inc.); Bank Street Writer (Brodebund); Format II (Kensington Microware); Home-Word & Screen Writer (Sierra On-Line Inc.); †PFS: WRITE-DOS (Software Publishing, Inc.); †CP/M-Wordstar (Digital Research Corp.-Micropro International); and others. Owners of trademarks indicated in parentheses. Black's Law Dictionary (West Publishing, Inc.); Stedman's Medical Dictionary (Waverly Press, Inc.)

†Note: CP/M, Pascal and PFS: WRITE-DOS versions do not suggest correct spelling of words or allow immediate correction of misspellings.

Sensible Grammar™ is available for $99.95; **Sensible Speller™** for $125.00 in either the "IV" or ProDOS version; **Sensible Technical Dictionary™** for $59.95; **Stedman's Medical Dictionary™** for $99.95; and **Black's Law Dictionary™** for $99.95. The three specialized dictionaries require the **Sensible Speller.** All programs are available separately and run on Apple® computers.

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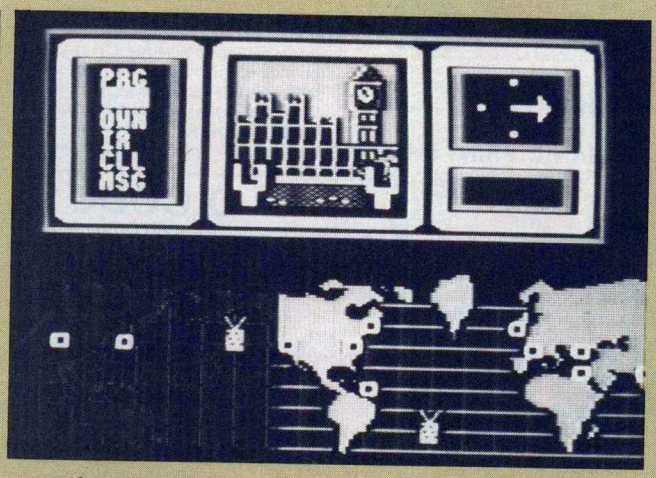
CIRCLE 227 ON READER SERVICE CARD

shaded to show day and night; an animated image of the tunnels; a list of commands; and a compass. When surfacing from the tunnels, you'll have the opportunity to scroll past some of the world's famous landmarks. You use the mouse to select direction of movement on the compass or to choose appropriate commands from the command list. The sounds are nerve-racking, but you can turn them off at any time.

Hacker is very difficult to complete under the best of circumstances. Realizing this, Activision will send you a hint sheet, but don't count on it to reveal all the answers. If all else fails, you can use the Hacker Help Hotline.

After you have figured



everything out and mapped the entire network of tunnels, you may still run out of time, just as you are on the last leg of the mission—just one more problem to solve. If you do complete the game, my spies tell me, there is a secret way to scramble the solutions to the game so that you can start over.

Hacker is fun, confusing, hectic, and intriguing. Simple in concept, it is sufficiently loaded with diabolical nuances to challenge any player. The graphics are sometimes excellent and always pleasing. Game play is convenient, since the mouse controls the majority of the action and the keyboard only a small amount.

Don't expect to complete Hacker in your first attempt. Patience, attention to detail, good guesswork, and efficient planning all go into successful completion of this game. If you have been looking for a mysterious game to play, Hacker may be it.

Rusel DeMaria

Hacker
Activision, Inc.
2350 Bayshore Frontage Road
Mountain View, CA 94043
(415) 960-0410
List Price: $44.95
Requires: Macintosh
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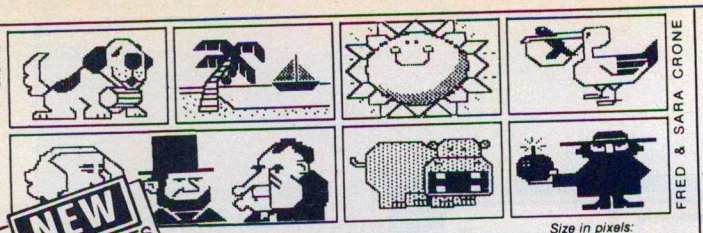

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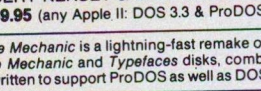
Shape Mechanic is a lightning-fast remake of our *Apple Mechanic* and *Typefaces* disks, combined & rewritten to support ProDOS as well as DOS 3.3.



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SAMPLE TYPE: Most of these fonts were on our old *"Typefaces"* disk—in DOS 3.3 only.

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  PRINT X;: HTAB 26-X: PRINT X;: GOTO 2
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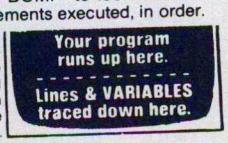
"Live" tracing too, with each executing statement, line no. and selected variable value in a window at the bottom of screen.



BREAKPOINTS: Your program stops when you want. For example, when X gets set to 99, or the 3rd time a Gosub occurs.

LIGHTNING-FAST FIND: Find strings & variables *fast*—search big programs in apx. *2 seconds*—very useful! D Code is fully-transparent to your programs, and compatible with GPLE, Double-Take, etc.

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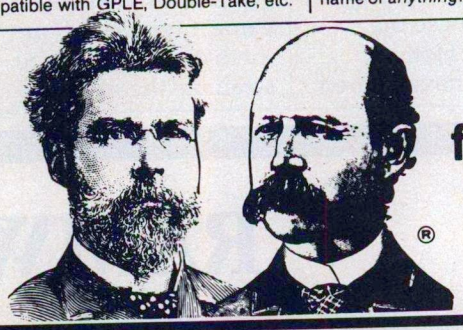

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CIRCLE 147 ON READER SERVICE CARD

BY MICHAEL WIESENBERG

WHEN ADDITION EQUALS MULTIPLICATION

In search of a quick and clever mathematics program

WILLY KEATS

In the heart of Silicon Valley, the members of the FORTRAN team of I-Q Industries are breakfasting at the house of a team member who is fortunate enough to live within a mile of the main plant. This working day is being devoted to the Valley phenomenon known as The Off-Site Meeting.

Project leader Carolyn Clawson arrives last, at 8:45 A.M., late because she burned the first batch of blueberry muffins and had to make another.

Grey Scrivener has just had his job title changed. He started at I-Q five years ago as a technical writer and became a senior technical writer two years later. In a recent companywide reclassification of all job categories, a new writing position has been created. Scrivener is now a technical writing specialist. He still performs the same job, writing smooth-flowing language manuals aimed at experienced programmers.

The corporate shuffling has transformed senior programmer Spotswood Gilbert into an R&D engineer, without affecting his responsibilities.

Hotshot young programmer Bob Levin loads his plate with two muffins, a slice of cake, and four cookies, while balancing coffee and juice.

Clawson sets up a flip chart. "Let's write down some of our concerns. Spotswood, you're closest to the chart; why don't you do the writing?"

Starla Chan is the newest member of the FORTRAN team. She has been working on the conversion utilities, transforming programs on the company's present line of computers to those that will compile in the version of FORTRAN developed specifically to run on I-Q's new reduced-instruction-set computers, the so-called RISC architecture. "We need a method of notifying everyone when a complete dump will be done, since all members of the group are on different systems. It's no good putting the messages on IQMAIL, because MAIL is down half the time, and the rest of the time no one reads it."

'Didn't you notice that the clerk pressed the times key between each purchase?'

Marion Smith, the sysop without whose silver thumbs none of the group's computers would run for more than a few hours at a time, concurs. "That's for sure. The only way I can get a system message to you clowns is to deliver it by hand."

Gilbert writes DUMP MESSAGES on the flip chart.

Scrivener knows about communications; that was his minor at Stanford. "What about putting the messages on a corkboard or white board?"

Chan moves closer to the fire to ward off the early-morning chill. "Would people read them with the same frequency as they clean out their IN baskets?"

Ace coder Sally McRae is also cold and approaches the fire. "Put it by the food."

Gilbert writes WHITE BOARD BY FOOD. "That'll make sure that Bobby and I always see it."

Levin puts two more muffins and the last slice of cake on his plate and refills his coffee cup. "Before we get into the future of languages at I-Q, I've got a great computer puzzle for everyone."

Gilbert puts the cap back on the indelible marker. "I haven't managed

to figure out the black-and-white-marbles puzzle yet."

"This one's even more fun."

A famed mathematician enters a convenience store with a friend and picks out four items, each costing an integral number of cents.

The sales clerk enters the purchases on a desk calculator and presses the equals key. "That will be $7.11."

Outside the store, the friend says, "Didn't you notice that the clerk pressed the times key between each purchase instead of the plus key?"

"Of course I did, but since the total was the same as it would have been if he'd used the plus key, I saw no need to complain."

How much did each item cost?

Scrivener carefully removes the Twinings Earl Grey teabag from his cup, squeezes a wedge of lemon, and adds two sugar cubes. "That's not hard; your program would have four nested loops, each testing all possible numbers between .01 and 7.11, in steps of one cent, multiplying each and adding each and stopping when the totals were the same."

"Ah yes, but that's not very efficient. You'd have to run all the loops to complete execution to make sure your solution was unique. That requires more than half a trillion calculations and would take *years*. I wonder who can come up with the program that executes the fastest?"

After further discussion of clever algorithms for this puzzle, the group returns to listing concerns on the flip chart. They also discuss some of the new computer languages being developed by the military; 4GL, the upcoming fourth-generation languages; and how these can be fit into I-Q's development plans.

All then break for lunch, carpooling to an authentic Mexican restaurant on a side street in Mountain View, as opposed to one of those expensive chic plastic places that seem to clog the major arteries of Silicon Valley.

Scrivener's solution would require more than half a trillion calculations and would take years.

The Challenge

This time the challenge is not just to devise a program that determines the prices of the four items but also one that, because of the cleverness of its logic, solves the problem in a minimum of time. We ask for a complete program only (in any programming language that runs on an Apple II or a Mac). The best solution wins you a one-year subscription to *A+* and a Certificate of Excellence in Programming and will be published here. Remember that a good program is self-documenting.

All entries for this month's contest must be received by March 6, 1986. Please send all entries to Computer Calisthenics, c/o *A+* Magazine, 11 Davis Drive, Belmont, CA 94002. If you want us to return your entry, enclose a self-addressed, stamped envelope or diskette mailer. The winner will be selected by the author, whose decision will be final. The winning program will be announced in an upcoming issue of *A+*. ✚

(For the winning solution to December's puzzle, see the following page.)

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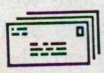
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CIRCLE 344 ON READER SERVICE CARD

COMPUTER CALISTHENICS

DECEMBER'S WINNER

Steven Lilker

Judging by the number of correct solutions I received to the tickets-and-envelopes puzzle, which appeared in the December issue, *A+* has a lot of sharp readers. The Certificate of Excellence in Programming and the year's subscription to *A+* go to Steven Lilker of Monte Sereno, California, whose Apple Pascal program was the best documented. His was also one of the only two that used integers rather than real numbers to determine the answer. Although real numbers can produce the precise answer for as many as 15 envelopes, they are only approximations beyond that. Integers tend to overflow their range sooner than floating-point numbers, but they always produce the precise answer, which I feel this puzzle indicated. Overflow is a fault of the machine on which the program runs, not of the program.

The runner-up was Donald Girod, who generated answers accurate to 120 digits. Honorable mentions go to Bob Allen, Russell Fascenda, Scott Johnson, Richard Kaye, David Mayers, Peter Polash, David Sachs, J. Michael Scarborough, and Barry Schwarz.

```
PROGRAM tickets(input,output);

TYPE
   longint: integer[36];

VAR
   n : longint; { number or tickets }

FUNCTION f(
             m, { min number of tickets per envelope                    }
             s, { subtotal (number of tickets put in envelopes so far) }
             n, { number of tickets (and envelopes)                     }
             d, { denominator for expression fact(n)/d                  }
             r: { repetition factor used to build denominator           }
                longint
          ) : longint;


FUNCTION factorial(x : longint) : longint;

VAR
   y : longint;
BEGIN
   y := 1;
   WHILE x > 1 DO BEGIN
      y := x * y;
      x := x - 1;
   END;
   factorial := y;
END;  {factorial}

BEGIN
   IF s = n THEN BEGIN
      { Have used exactly n tickets.  In this case, we have

           e1 envelopes containing t1 tickets
           e2 envelopes containing t2 tickets
                          .
                          .
           ek envelopes containing tk tickets

        where e1*t1 + e2*t2 + .. ek*tk = n
        for which the number of combinations is

                           n!
          ------------------------------------
          e1! * t1! * e2! * t2! * .. ek! * tk!

        At this point in the program, d contains the denominator of
        the preceding equation. }

      f := factorial(n) div d;
   END
   ELSE BEGIN
      IF  ( s + m > n) THEN BEGIN
         { will use more than n tickets }
         f := 0;
      END
      ELSE BEGIN
         { Have not yet used n tickets.  In this case the number
           of solutions is equal to the number of solutions where
           we put m tickets in the current envelope and can use
           no less than m tickets in any succeeding envelopes plus
           the number of solutions in which we do not put m tickets
           in the current envelope but instead require all succeeding
           envelopes to have at least m+1 tickets. }

         f := f(  m, s+m, n, r*factorial(m)*d, r+1) +
              f(m+1,   s, n,               d,   1)
      END
   END
END;  {f}

BEGIN
   write(output, 'Number of tickets? ');
   readln(input,n);
   writeln(output, 'f(', n:1, ') = ', f(1, 0, n, 1, 1):1);
END.
```

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Project Victoria

AN EXPERIMENT IN TELECOMMUNICATIONS

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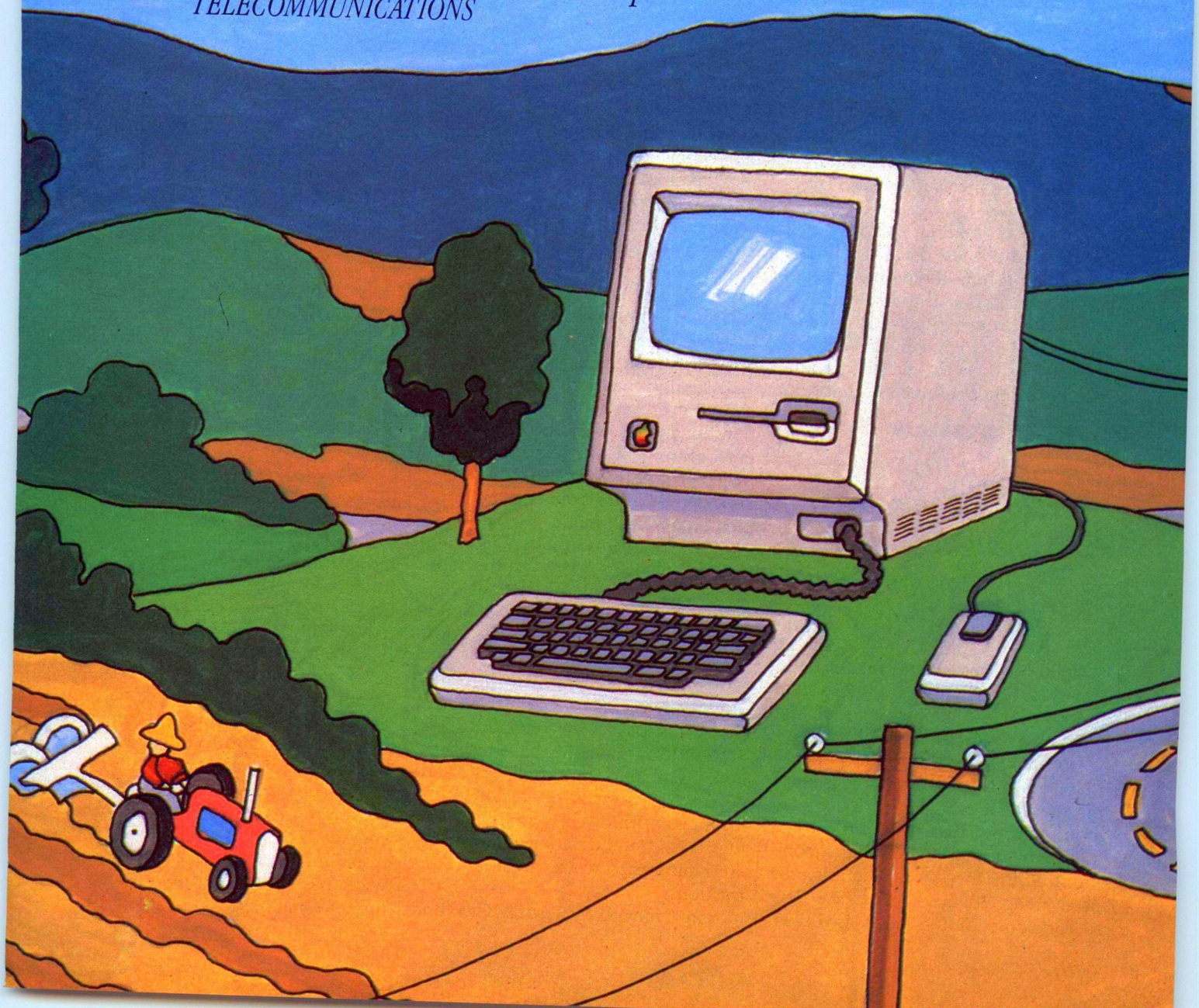

The Macintosh plays a key role in an experimental telecommunications system.

PROJECT VICTORIA

If you've found that having a computer and modem ties up the phone worse than having an extra teenager in the house, help is on the way. An Apple Macintosh or other computer and up to four other digital services soon will be able to share a single standard telephone line with two normal voice conversations.

At least they will be able to if an experimental system beginning a test in Danville, California, is successful. The experiment, run by San Francisco-based Pacific Bell, with help from Apple and other vendors, is a forerunner of what promises to be a new era of computer-compatible telephone services.

For Project Victoria, as Pacific Bell has dubbed the test, each of the 200 participating households uses a special box that connects to its telephone line, with connections for normal phones and up to five digital services. One of those services will be a high-speed computer connection that runs at 9600 bits per second (about eight times as fast as the 1200 bps that most ordinary modems provide), and four others will run at 1200 bps.

For individual participants, the experiment promises to be an information bonanza.

To enable the participants to use that 9600-bps channel, Apple is lending each household a Macintosh 512K with two disk drives. Although intended primarily for data communication, the Macs can also be used independently.

For some of the firms involved, Project Victoria will serve primarily as a test of some special hardware and connection arrangements. Pacific Bell claims the hardware is unique and has applied for several patents. For Apple and most others, however, Project Victoria is primarily a laboratory to look at how people would use computers and related services if communications speeds were faster, access to information were easier, costs were lower, and the whole system were oriented to users' needs.

For individual participants, the experiment promises to be an information bonanza. Several of the vendors participating in the test are already major on-line information providers, and Victoria households will get complementary accounts.

Dow Jones Information Services (Princeton, New Jersey) will supply access to its News and Retrieval Service, which includes financial information, databases, and the Dow Jones News Service.

For local news, Chronicle Information Services of San Francisco will supply its Bay Area Teleguide. The Teleguide, a videotex-based service now available primarily through dedicated terminals in selected public locations, includes information about regional transportation, shopping, entertainment, restaurants, and attractions.

San Francisco's Pacific Gas and Electric, the local utility, also wants to be an information provider for the Victoria test. Although PG&E hopes to test out the use of the lower-speed digital connections for remote meter reading and usage-sensitive pricing, it's planning to start by putting together an electronic newsletter that will cover billing, meter reading, customer billing inquiries, new programs, home-energy audits, and other topics it now writes about in paper-based publications.

Both videotex systems will use NAPLPS (North American Presentation Level Protocol Syntax) encoding. NAPLPS, backed by AT&T and a host of other firms, as well as the Canadian government, makes it possible to send pictorial information over a telecommunications link by encoding pictures as objects rather than as dots (much like MacDraw, in comparison to MacPaint). So far, videotex services have been more successful with dedicated terminals than with personal computers, so Victoria will be an important test of videotex's acceptance when access is more convenient.

Beyond Receiving

Project Victoria participants won't just be receiving communications, of course. MCI Mail will provide electronic-mail services stretching worldwide, based on its store-and-forward (user-to-mailbox, rather than direct

ROBERT BAUSCH

Robert Bausch

user-to-user) technology. MCI is also interconnected with the international telex network, so users can send and receive electronic exchanges with its more traditional message terminals. For sending mail to people who are not on-line, MCI offers a range of overnight and next-day delivery of laser-printed versions of messages.

Applied Videotex Systems, which claims to run some of the largest and most-used local bulletin-board systems, will be setting up an electronic-message and memory system for Victoria, using a MicroVax minicomputer on loan from Digital Equipment Corporation. Once it's set up, Chronicle Information Services will run it.

In contrast to the Chronicle-run Teleguide, however, the bulletin-board system will be character-based and will allow users to post as well as receive information. It will also serve as the connection for Mac-to-Mac communication, since the current incarnation of the Victoria system doesn't provide for local direct connections between subscribers. Non-Victoria users will also be able to dial in, using a normal phone-and-modem configuration.

To exchange monetary credits rather than information, Victoria participants will have to open a checking account with Security Pacific Bank and supply their own deposits, but the bank will supply the service. Right now, Security is doing its own market and technical testing in Southern California, so the bank sees Victoria as a chance to broaden both the depth of its testing and its marketing presence in Northern California.

Coping with this plenitude of new resources may prove daunting to a computer neophyte, and even accomplished telecommunicators may find it difficult to keep track of this wide array of disparate services. One objective of the project has therefore been to clothe the power in a user interface that is smooth, seamless, and easy to use. The Macintosh is ideally suited to this goal.

The videotex software, along with all the other communications programs, will be bundled into a master front-end program based closely on Straight Talk, Dow Jones' existing telecommunications product for the Macintosh. Like the standard Straight Talk, the Victoria version is being developed by Vermont-based Solutions, Inc. The Victoria version will include an overall menu, some ongoing improvements to the standard features, and a closed system limited to the participating information providers (the normal Straight Talk allows you to add additional services to its main menu).

On the hardware side, the Macintosh and the multiplexer box are all that participants see during this first experiment. Furthermore, the multiplexer doesn't need any attention from users (it's set up with software downloaded from the central office). Another, larger, multiplexer at the central office connects the digital signals to the information providers and the voice data back into the normal telephone voice channel.

Sharing the Wires

One of the biggest barriers to an age of cheap and plentiful information is the smallness of the existing connecting wires over which signals have to flow. The only electronic link available to most households and small businesses is a small number of twisted pairs of copper wire now used

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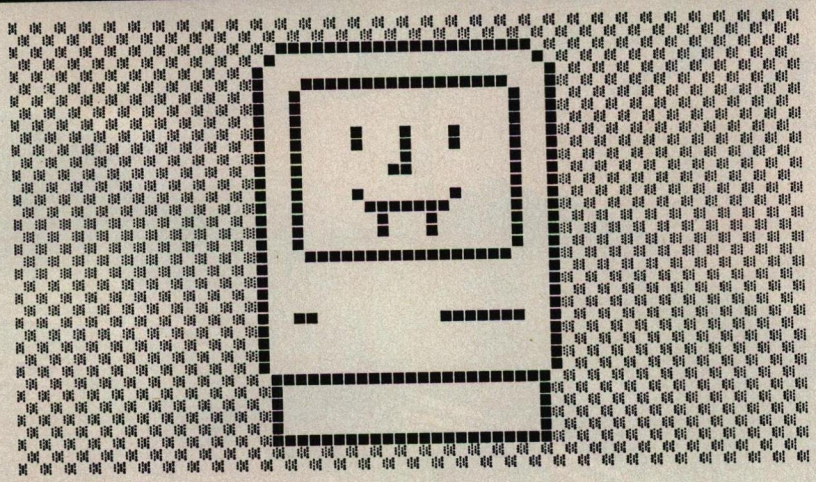

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to carry telephone conversations.

"Faster modems or fiber optics may not be the answer," says Pacific Bell's executive director for technology assessment and planning, Tom Edrington. Modems, which convert digital data back and forth into the audio signals that the telephone network presently expects, are expensive, relatively inflexible, and limited in transmission speed. Fiber optics are capable, but expensive to add to every household's service.

Furthermore, internally, the telephone network is increasingly based on digital-transmission technology. What goes in as voice signals at one end has a very good chance of being converted to digital form for most of its travel, to become audio again only at the far end of the journey. A digital signal going through a modem, consequently, may be converted to audio, only to go right back to digital, then back to audio, and finally back to digital.

The overall solution, say most communications experts, is an "integrated services digital network" (ISDN), a complete communications connection that will pass both voice and data information without excessive conversions. Several international standards bodies, led principally by the CCIT (Consultative Committee for International Telecommunications), have been working on defining such a network and working out how the present system can interconnect and evolve into ISDN.

The overall solution, say most experts, is an 'integrated services digital network.'

Compared to the ISDN model, which calls for two sharable data channels and one supervisory connection over each link, Project Victoria is somewhat limited. However, the participating vendors and project managers point out that it is real, ready to be tested, and an important and useful first step. ✚

A+ consulting editor Steve Rosenthal tries to keep from getting his wires crossed as he shares his output among six magazines and a TV show each month.

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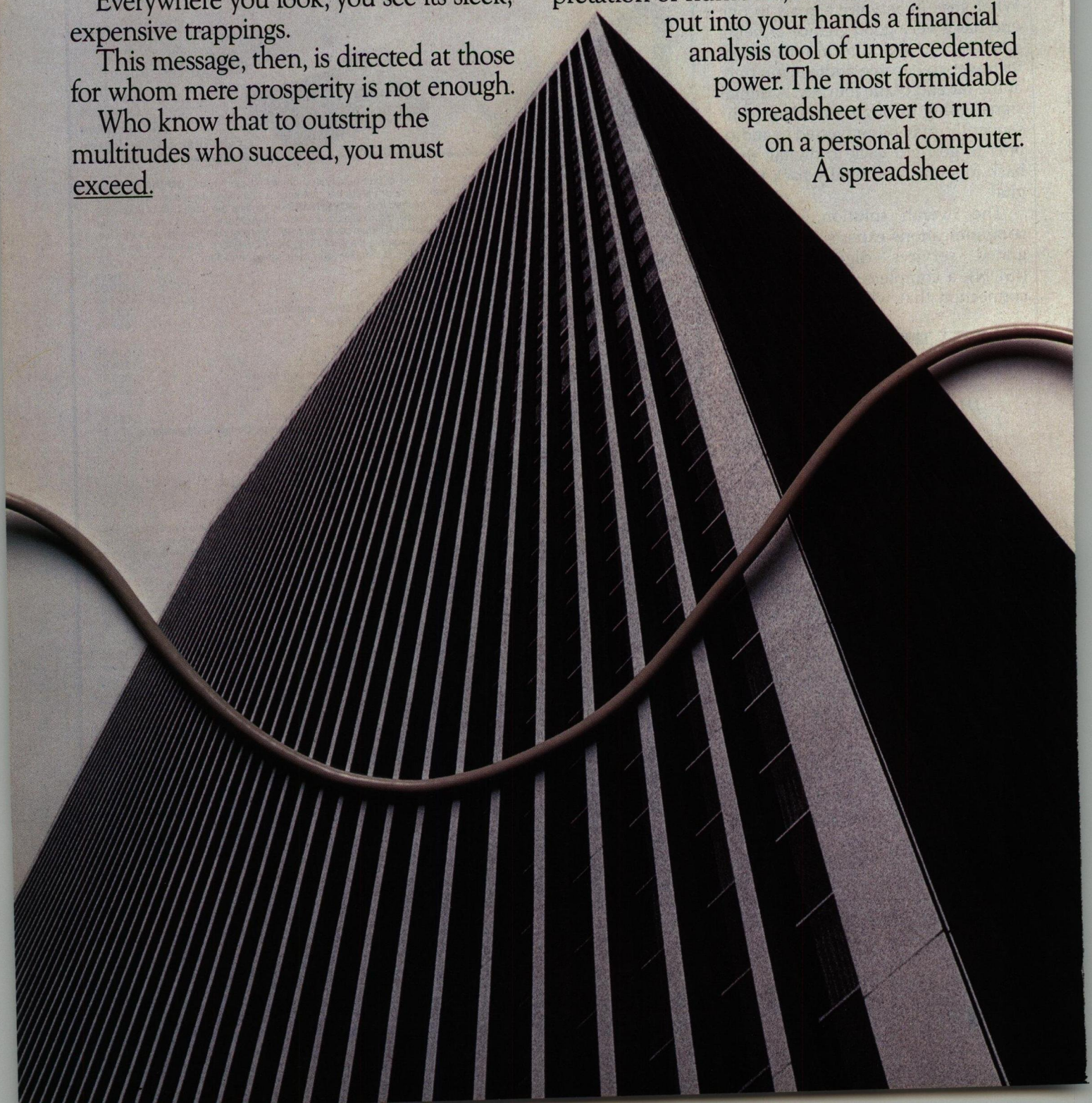

strivers, your unabashedly to succeed the boss.

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The Journal o
AND COMMERC
FRIDAY, DECEMBER
Rail Crossing Accidents
By JULIANA KING
Journal of Commerce Staff
WASHINGTON — There has
been significant success in cutting
the railroad grade crossing ac-
cidents in the past six years, de-
spite an increase in accidents last
year.
The number of rail crossing
accidents fell by more than 40
percent between 1979 and 1983,
Railroad Crossing Accidents
Fatalities, 1979-83
12000
10000
8000
6000
4000
2000
0
1979
1980
1981
1982
1983
DOUG PINKERTON/Jou
*Preliminary figures for first eight months of the year.
SOURCE: National Transportation Safety Board and the
Railroad Administration
dangers that can be encountered
at rail-roadway crossings.
The program, now nationwide,
also focuses on ways to improve
crossing safety through more reli-
able train warning systems and
through enhancing crossing visi-
bility by clearing out obstructing
brush, snowbanks and even tall
corn.
Operation Lifesaver still
stresses public awareness of
crossing risks through student and
school bus driver programs that
point out the need for caution at
crossings because of the difficulty
in stopping trains at short notice.
Such information can be an
eye-opener for motorists, who
may not realize a 150-car train
traveling 50 miles per hour needs
1.5 miles of track to stop safely.
Even an eight-car passenger
train traveling 70 miles per hour
requires over a
space, safety data
Another factor
of crossing acci
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The recommend
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Rock Island and Pa
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made the National S
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of Operation Lifesav
They also enlisted
the Association of Am
roads, the Nationa
Traffic Safety Admin
SEE CROSSING
Truck
By MICHAE
Journal of C
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Allegations

PUBLISHING *BY CRAIG L. WEBB*

From Show Page to the front page

The MAC MAKES NEWS IN THE NEWSROOM

My first boss was a gnarled old Iowan who often said the best tool a turn-of-the-century journalist could own was an empty coffee can. In those days, he said, the wire-service report came via telegraph, and editors had found that an overturned coffee can made a dandy amplifier for the clicks they had to hear to learn the news.

The cans may be gone now, but you still can find newshounds displaying that old green-eyeshade practicality when they use a Macintosh. The newspaper industry was among the first to plug into word processors more than a decade ago, and journalists were exploring—and adapting—Apple's latest computer long before appropriate software appeared. Now they are sold on the Macintosh: 47.4% of the newspapers answering a recent Society of Newspaper Design survey counted Macs in their graphics departments. What's more, four out of every five editors who planned to buy a graphics computer soon and had decided what they wanted said they were buying a Macintosh. David B. Gray of the Providence, Rhode Island, *Journal and Evening Bulletin*, who conducted the poll, believes the survey "probably underestimates the Mac" and its popularity.

There's Mac All Over

The Macintosh seems to thrive just about everywhere in the Fourth Estate. Consider some uses:

- In tiny Hopkinsville, Kentucky, David Riley of the *New Era* employs his 128K Mac and ImageWriter to create charts on the price of tobacco leaf auctioned at the local market, changing the bars on the graph into cigarettes. He then fiddles with the chart to show statewide prices and sends it to other newspapers over the Associated Press photo network.
- In Rogue River, Oregon, newspaper owner Peter Morales has stopped making boxes for advertisements with tape and a knife: he creates them with MacDraft and cranks them out on his LaserWriter.
- In Dallas, The *Texas Woman's News* is written and partly laid out on the Mac.
- Across the country, Knight-Ridder chain newspapers are trading ideas and completed artwork on a new graphics network.

Even entertainment programs find a place in the newsroom. At United Press International, where I work on the Foreign Desk, we used the Sargon III chess program to check the moves of the recent world championship in Moscow. We could also have taken a snapshot of the screen to give UPI clients an idea of how the chess board looked at the end of each match.

UPI's graphics department has begun working with Apple Computer to develop new products, such as artwork and logos, while generally testing the Mac's capabilities in producing news graphics. Department chief Joseph Scopin says the biggest problems ahead lie in developing higher-quality, lower-cost printers and inventing type that marries better with the LaserWriter.

The newspaper industry generally appears to be of two minds about the Macintosh. Smaller newspapers tend to overlook the typesetting and page-layout problems to fit the Macintosh into every part of their work. Larger operations worry more about printing resolution but are content in the meantime to buy Macs, if only to handle one or two tasks. For examples of both approaches, consider life at the tiny *Todd County Standard* of Elkton, Kentucky, and at America's graphics superstar, *USA Today*.

The Todd County Story

Elkton, a hamlet 50 miles northwest of Nashville, Tennessee, used to be like many of its neighbors in that its newspaper set copy on an old, arthritic typesetter. Today the *Standard*'s coeditors, Mark Howell and Mike Finch, write their stories on two 512K Macs equipped with ReadySetGo page-composition software from Manhattan Graphics and then print the stories on a LaserWriter. The backs of those stories, complete with headlines, then get a coat of beeswax, enabling the editors to slap the sheets onto a prototype of the full newspaper called a pasteup. A photo of the entire pasted-up page then is taken, and the negative of that photo is used to create the printing plate.

"The nicest thing (about the Mac) for us is that it gets us around the limitations of our Compugraphic typesetter, which doesn't have any kind of storage system," Finch says. "With the Compugraphic, when you think, 'Gee, I'd like to have this in two columns,' you've got to type it all over again. With the Macintosh, it's no problem to change. And it costs only about four cents a sheet to make changes, whereas it's 50 cents a linear

PACIFIC HORIZONS

foot with the typesetter paper."

That concern for dollars and cents extends to the mailing operation—the original reason Howell and Finch bought a Mac. Like many small-town weeklies, the *Standard* is distributed via second-class mail. The pair thought they were in trouble in 1984 when the Postal Service raised its rates, but then they found they could offset some of that increase by sorting the papers according to carrier routes. They set up their list of 1750 subscribers on the Macintosh with the OverVUE database-management program, organizing them by route, and soon were printing mailing labels from the newly reorganized list on their two ImageWriters.

The change cut the effect of the price increase by at least $8 a week and provided an unforeseen bonus. The newspaper now can offer to carry advertising inserts targeted at certain carrier routes, thus picking up revenue they might otherwise have lost.

The Macintosh seems to thrive just about everywhere in the Fourth Estate.

"If advertisers want to know how much circulation we have in a particular area, we can just call it up," Finch explains. "Before, we never knew, because we would have had to go into the back and count through the Addressograph stamps."

Finch says he can create advertisements on the Mac 60% faster than by hand and, with ReadySetGo page-composition software, can generate background screens that he used to have to buy.

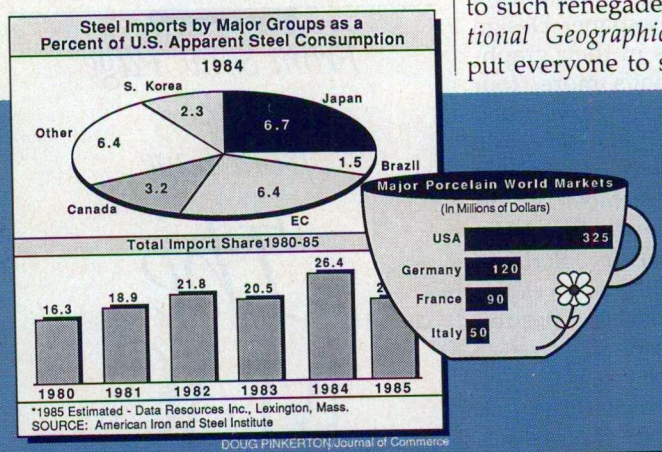
If the Macintosh becomes America's dominant graphics computer, Apple should send a bouquet to Richard Curtis. Curtis is the managing editor for graphics and photography at *USA Today*, America's third-largest newspaper (at 1.4 million copies daily) and the colorful catalyst that sent publishers nationwide rushing to put more color and art on their pages.

When *USA Today* started in September 1982, newspapers produced charts and maps in pretty much the same way that they did during the Civil War, when newspaper maps first started appearing regularly. Charts were hand-drawn on graph paper and had to be changed if the artist miscalculated or used the wrong scale. Maps generally involved tracing from atlases or off pictures of a globe.

Such labor usually didn't seem worth the effort, so graphics were left to such renegade publications as *National Geographic*. Then *USA Today* put everyone to shame with its color

Graphic News from the Mac

These are just a few examples of how newspapers across the country are using the Macintosh to create graphic accompaniment for their news stories.



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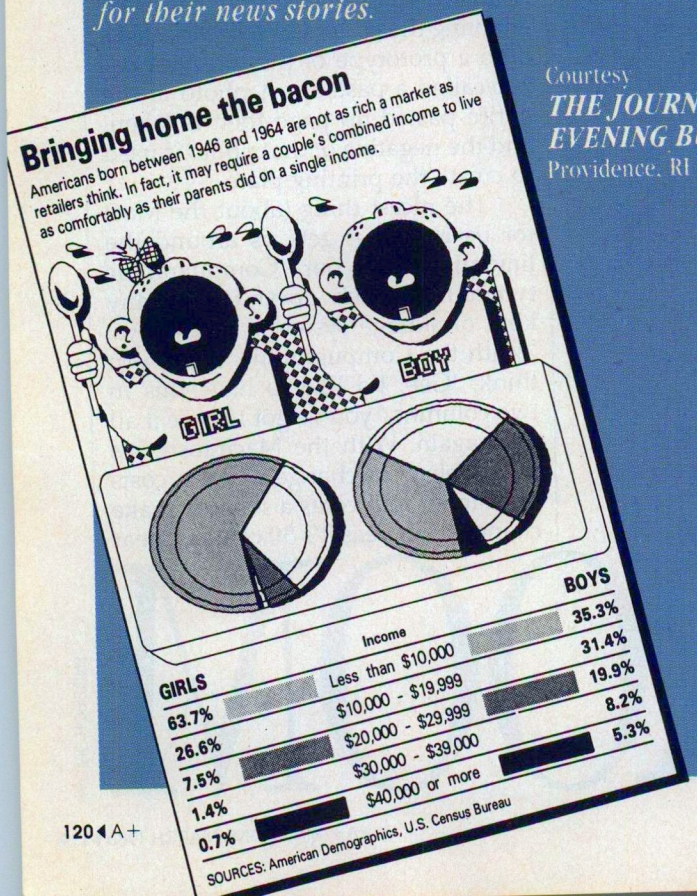

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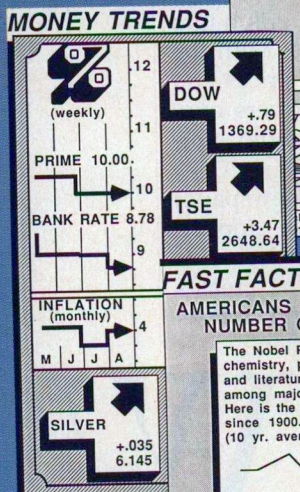

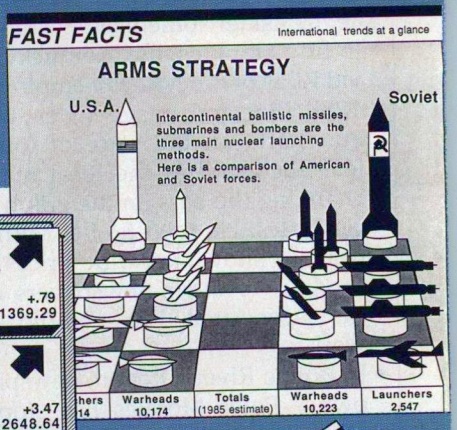

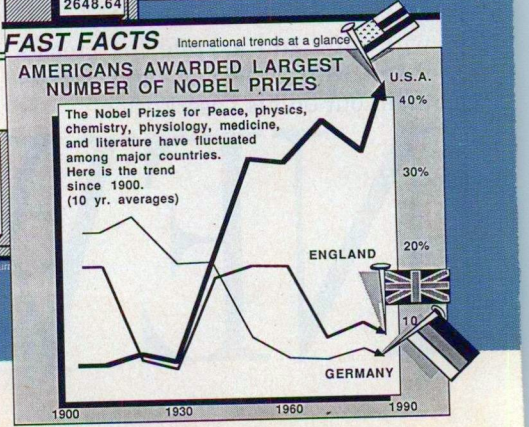

Courtesy
THE CANADIAN PRESS
Toronto, Ontario

and its demonstration that graphics often can tell a story better than a column of words.

USA Today's secret in its early months was the size of its work force. It had more than a dozen artists, more staffers than you'd find in most newspapers' entire newsrooms. Only the biggest publications could fight back by hiring graphics personnel. Then came the Macintosh, enabling even the clumsiest of artists to produce decent charts. Now the battle would seem more even, were it not for Curtis' purchase of several dozen 512K Macs and his plans to get hard disks next.

Electronic Sketch Pads

Curtis says he originally got the Macs because he thought they might serve as electronic sketch pads, but he quickly learned how much they could help in the nuts and bolts of graphics work. With Microsoft's Chart, for example, artists can get, within minutes, a variety of graphics showing how data looks in bar-, line-, or pie-chart form. Often, Curtis adds, the computer's most valuable contribution lies in showing that a story doesn't deserve to be written.

Many editors appreciate the Mac for the way it accommodates last-minute changes.

"Using Chart, you can just plug the numbers in," says Vince Grippi of the Spokane, Washington, *Spokesman-Review and Chronicle*. "And when you present numbers, you've got to take time to make sure you've presented them right. With the Mac, I don't have to worry about whether I made the chart correctly and can spend more time worrying about whether I'm presenting it the best way."

Mapmaking on the Macintosh remains fairly tedious work, but *USA Today* has slowly been building its own library of maps, and Grippi emerged from his first attempt at mapping the Northwest with the Macintosh determined to buy clip art. Riley, in Kentucky, says he often photocopies the map he wants, inserts the copy into the ImageWriter, and then moves it to the Mac screen via ThunderScan.

Many editors appreciate the Mac for the way it accommodates last-minute changes. In Toronto, Fred Wiebe produces graphics in both English and French for Canadian Press subscribers, often stretching his work when a phrase in one language takes up more space than in another.

"Just by changing a few things, I'm

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THE SAN FRANCISCO EXAMINER
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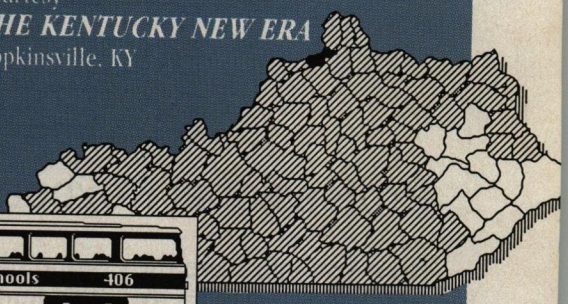
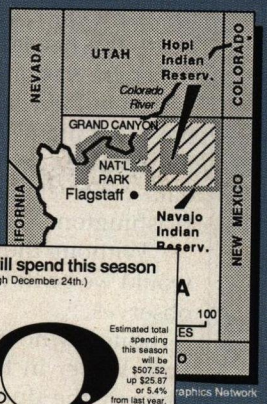
Hopkinsville, KY





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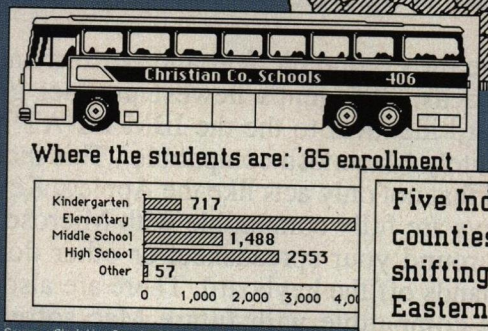

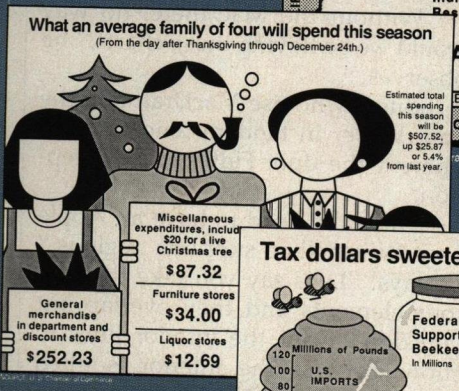

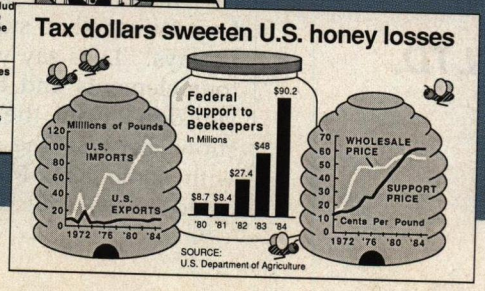

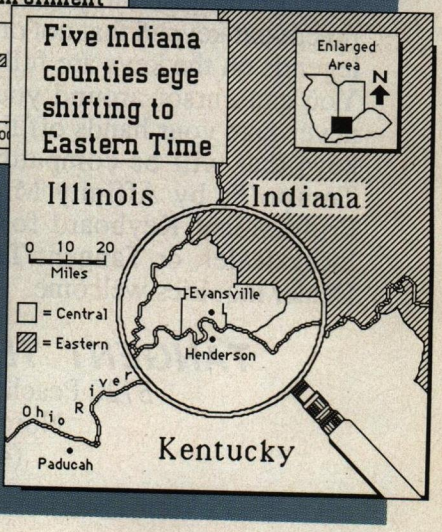

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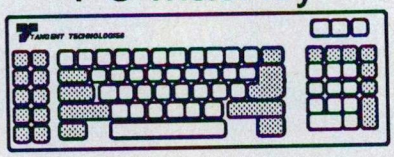

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able to get things done in one or two minutes that would take me an hour to do by hand," he comments.

Graphics Network

Knight-Ridder is taking the Mac one step further than most newspapers are by putting together what amounts to the first serious newspaper network for graphics. Roger Fidler, the chain's director of graphics and newsroom technology, says the

The Mac enables even the clumsiest of artists to produce decent charts.

net works off the General Electric Information Services system and should have all the chain's 28 newspapers, as well as the news-service headquarters in Washington, linked up by early 1986.

"What we want more than anything else is the ability to share graphic information for breaking stories," Fidler says. "For example, when the MOVE headquarters were bombed in Philadelphia, the *Inquirer* did a map of the area. That graphic could have been transmitted to all of our papers very quickly."

Douglas Pinkerton of Knight-Ridder's *Journal of Commerce* was among the first graphics chiefs to exploit the network when he encountered trouble getting a three-dimensional look for one of his charts. He transmitted it to Miami via 1200-bps modem, Fidler made the needed changes, and soon the chart was on its way back to Pinkerton in New Jersey. Pinkerton used the old Knight-Ridder message wire for a similar project in which he got data on trucking from a reporter in Washington.

"Without the Mac there, no way would we be having those charts," he observes.

Editors who use MacDraft and the LaserWriter in tandem tend to compliment the duo. Fidler is an exception.

"We really need to have an Apple LaserWriter that supports regions," he says. "Let's say you take three or four elements and they overlap but you don't want the interior lines to show, because the interior is filled with some text. MacDraft early on could do that, but later they decided

not to support it. Not having regions affects creating road maps—lots of things. For example, there's no way on a Mac now to punch a hole in a solid object so you can see through to something behind."

Other bugs have cropped up in some of the page-composition software, mainly because the three major programs were originally designed solely for 8½ × 11-inch sheets of paper and have had to be adapted for newspapers. Lorie Kiso, editor of *The Lake Times* in Osage Beach, Missouri, dislikes the way PageMaker keeps her from setting columns of less than 2¼ inches. Ray Warren, associate editor of the *Texas Woman's News*, says he occasionally finds that if he tries to do text editing with PageMaker, "we have to click on each element of the text we want to select, rather than click and slide, because it'll hang or you'll lose copy."

Karen Howe, marketing product manager at Aldus Corporation of Seattle, producer of PageMaker, says the bug Warren mentioned in the drag-select system has been fixed in Release 1.1, now available. She ex-

'What we want more than anything else is the ability to share graphic information for breaking stories.'

presses surprise at Kiso's claim, saying "We can get columns down to ⅜ of an inch."

No large newspapers use "pagination" software for the Mac. David Gray, in Providence, predicts that most big-city presses will tailor systems to their own computers.

Still, software makers appear anxious to keep upgrading their publishing products, seeking to share a market Howe estimates will spend $4 billion by 1990. Besides PageMaker's Release 1.1, other improved page-composition software includes a new version of MacPublisher from Boston Software Publishers, Inc., and Ready-SetGo's latest version is considered far more sophisticated than the original. The latest features on the market include the ability to lay out tabloid-size pages and work with color print-

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FOR THE MACINTOSH

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ers. The next enhancements appear to be better spacing between letters and lines, as well as automatic spelling checkers.

Printer Drivers

Hardware firms have been struggling to meet some editors' demands for low-cost, high-quality printers. The LaserWriter can put down about 300 dots per inch (dpi), but Scopin says he prefers resolution of at least 1000 dpi and likes typesetter quality of 2000 dpi. "If you look at what the LaserWriter produces, even without a magnifying glass, it's not as good a typeface" as what you can find coming out of a typesetter, the UPI executive says.

The ultimate gain from the Mac, then, is time: time to write a better story, or draft a better chart.

"I also have problems with the typefaces that are on there now," he adds. "It seems sort of obvious that they're not designed to make optimum use of the LaserWriter." Scopin looks forward to seeing what type designers such as the San Francisco firm of Bigelow & Holmes can produce.

The Allied Linotype Company of Hauppauge, New York, has unveiled a pair of Macintosh-driven typesetting machines, the Linotronic 100S and the Linotronic 300, that can produce 1270 dpi and 2540 dpi, respectively. The lesser-quality one sells for $29,900, and the fancier machine costs $49,950.

In the meantime, reporters such as Kiso say they are happy with what the Mac has already done.

"I have typeslexia," she explains. "You know—dyslexia is where you keep getting words backwards? With typeslexia you keep typing letters backward. With the Mac, I can fix it up, and it's fine. That's better than before, when you typed it and had to proof it over and over again."

The Ultimate Gain

The ultimate gain from the Mac, then, is time: time to write a better story, draft a better chart, or even sit back and talk about those old-time editors and their coffee cans. ✚

Craig L. Webb is an editor on the Foreign Desk at United Press International in Washington, D.C. He has written several articles on the use of the Macintosh in newspaper production.

PRODUCT INFORMATION

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Aldus Corporation
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Manhattan Graphics
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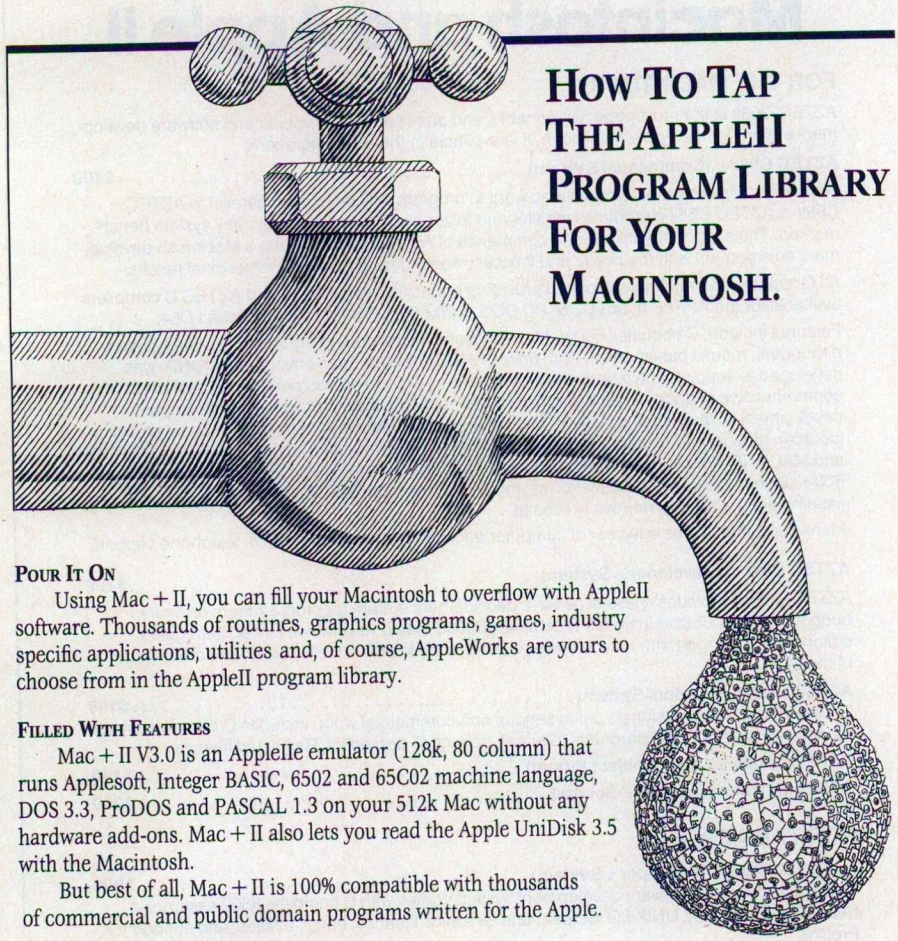

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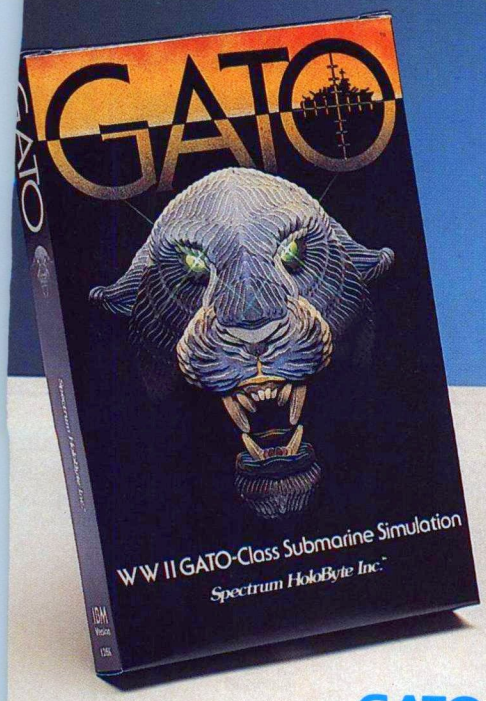

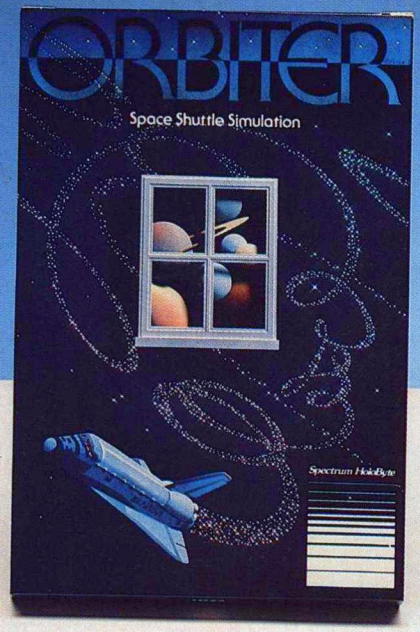

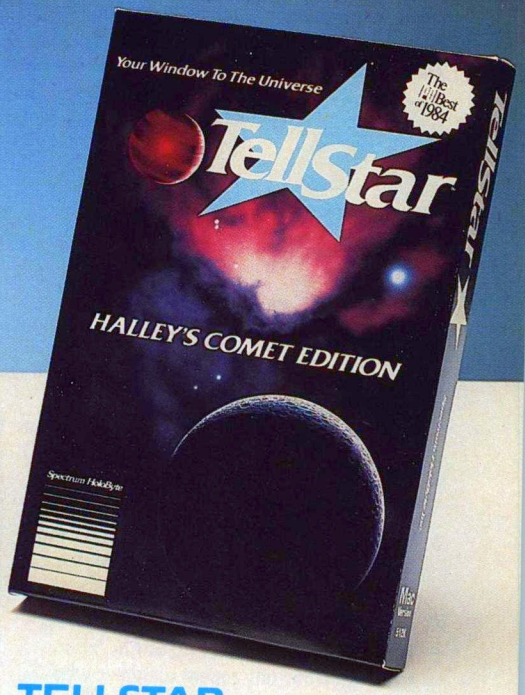

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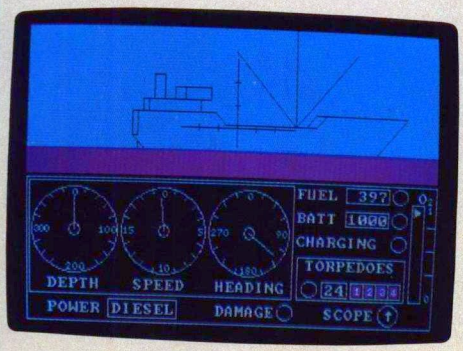

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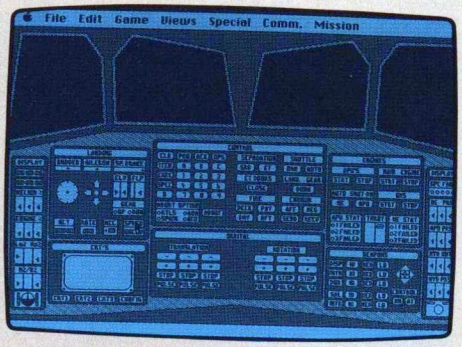

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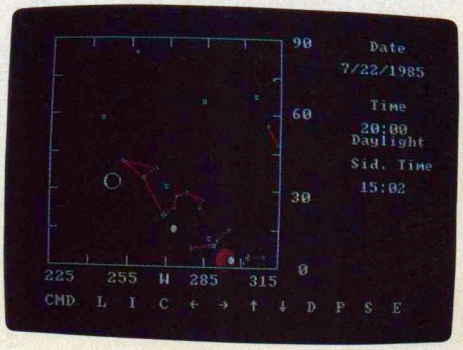

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An object-oriented language that makes the most of the Macintosh

NEON

When the Macintosh first came out, I decided I wanted to create programs for this machine, so I started to search for a good high-level language to use. The ideal language, I thought, would allow me to create programs that took advantage of the Macintosh Toolkit's routines and could be compiled into "launchable" applications.

I had a few other criteria, as well. For example, I have long agreed with the view that computers exist to run our programs and that we shouldn't have to think about programming at the machine level to express our ideas. Unfortunately, however, this view is not always reflected in the design of computer languages.

I have been greatly impressed by the power of programs written in Forth, for example, but I have had a hard time learning to write in this language. I keep wanting to work with rich collections of data types, and Forth keeps focusing my attention on the stack. I understand the operation of a LIFO (last in, first out) stack and can follow Forth's stack-manipulation commands such as DUP, SWAP, ROT, and so on, but programming at this minute level of detail makes it hard for me to keep my mind on the overall structure of my programs. I have been spoiled by languages such as Logo and LISP.

Enter Neon

When I first read the advertisements for Neon, the Macintosh-based language from Kriya Systems, Inc., I got the impression that someone had finally created the language I was looking for, a language with the speed of Forth and with features to which I had become accustomed with other languages.

Neon is considered to be an "object-oriented" language; the term was popularized by the Xerox research language Smalltalk. To understand Neon, you must first understand objects, and to understand objects, it helps if you understand programming metaphors.

The syntax of a computer language is often influenced by the metaphor that is used for computer programs written in it. For example, LISP programs behave like mathematical functions. They receive arguments when you run them, and they always return results. The functional programming metaphor of LISP has allowed the use of this language for many tasks that are not well suited to other computer languages.

Other languages have different metaphors. Pascal programs, for instance, are made of procedures consisting of commands to be carried out, and PROLOG programs are theorems for the computer to prove.

The metaphor for Neon (as for Simula and Smalltalk before it) is the object. In the Neon context, an object is a representation of a component in a program. Objects can be numbers, programs, rectangles, databases, strings, windows, video games—whatever you want them to be. Objects belong to classes, and you can create new objects as subclasses of other objects. Each object has some private memory and a set of methods or operations it can perform. These methods determine the behavior of the object, and you

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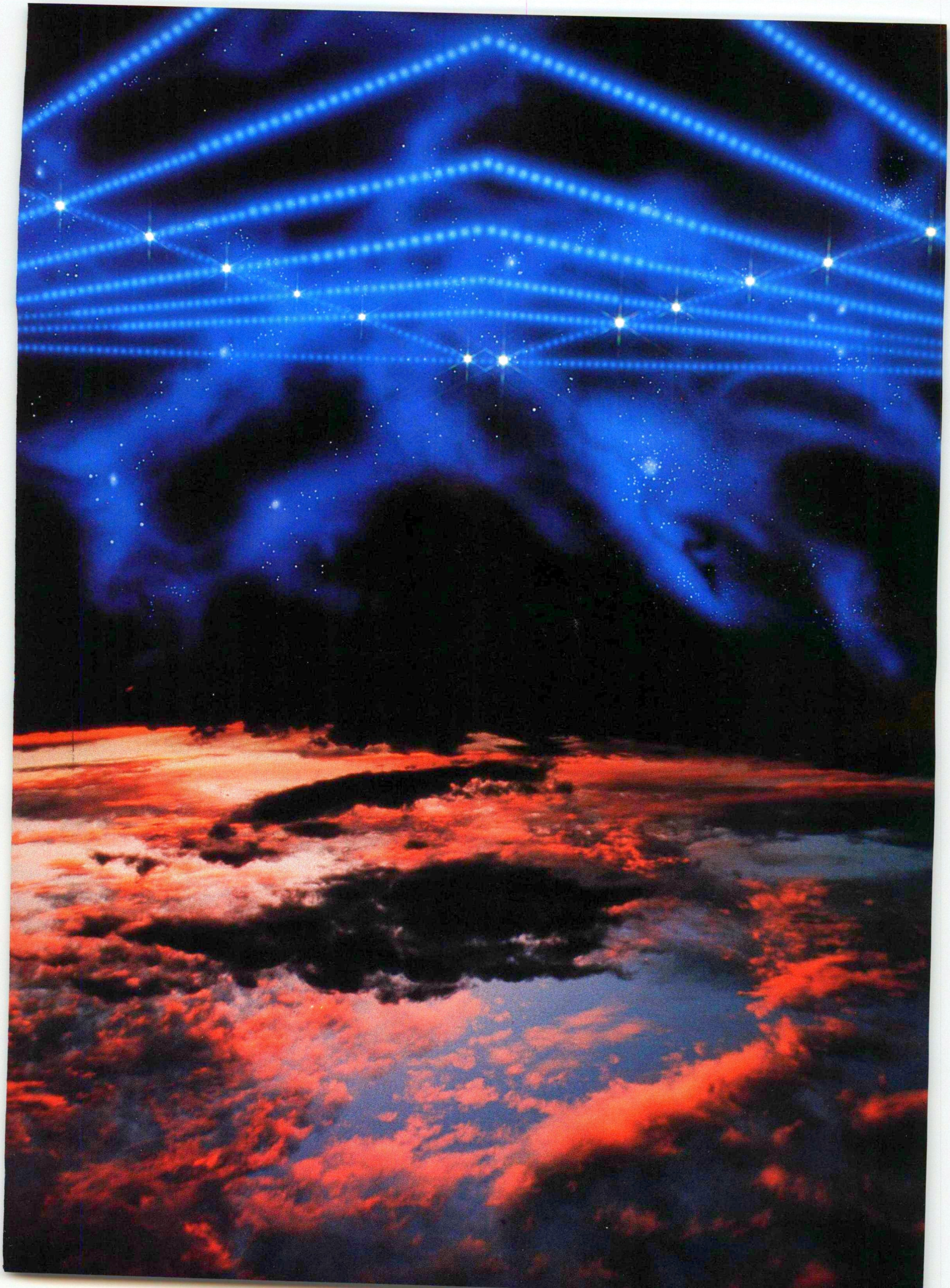

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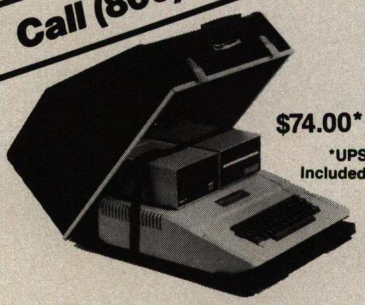

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invoke this behavior by sending "messages" to the object.

For example, an object that draws a rectangle on the screen has some private data containing the coordinates of the upper left and lower right corners of the box. The methods associated with this rectangle might include one to put coordinate values into the rectangle's private memory and another to draw the rectangle on the screen. To actually place a rectangle on the screen, you create an "instance" of the rectangle and send a message to load coordinate values into the private memory (called Instance Variables, or Ivars), followed by another message to draw the rectangle on the screen.

Creating programs in an object-oriented language consists of defining new classes of objects and sending messages to instances of these objects to operate the program. This model of programming is very different from what you encounter with languages such as Pascal. In a pure object-oriented language, for example, the number 6 is an instance of the class called Number, and you can interpret the command 6 + 4 this way: The numbers 6 and 4 are both objects, and the symbol + is just a message telling 6 to add 4 to itself. (Neon is not this pure, as we shall see).

Clearing the Mud

Let's look at an actual Neon object to see how it is constructed. One popular object is Rect, which allows rectangles to be drawn on the screen. Here's the definition of this object:

```
:CLASS Rect <Super Object
       Point TopLeft
       Point BotRight
       :M PUT: PUT: BotRight PUT:
       TopLeft ;M
       :M DRAW: ABS: Self CALL:
       FrameRect ;M
;CLASS
```

(Those of you who think the colons and semicolons are Forth-like, hang on—we'll get to that later.)

The first line of this definition creates a class called Rect whose superclass is called Object. The next two lines define the Ivars for this class. The variables TopLeft and BotRight are each instances of a variable class named Point, consisting of an ordered pair of integers. The following lines comprise the methods this class of object obeys. The first method defines the properties of the message

If you are totally confused at this point, it is probably because object-oriented programming is so different from other types of programming.

PUT:, which loads coordinate values from the stack into the object, and DRAW:, which draws a rectangle on the screen at these coordinates with the Toolbox routine FrameRect.

To draw a rectangle on the screen in Neon, you create an instance of Rect by typing, for example

```
Rect MyBox
```

and then sending the following messages to MyBox:

```
300 10 400 100 PUT: MyBox
DRAW: MyBox
```

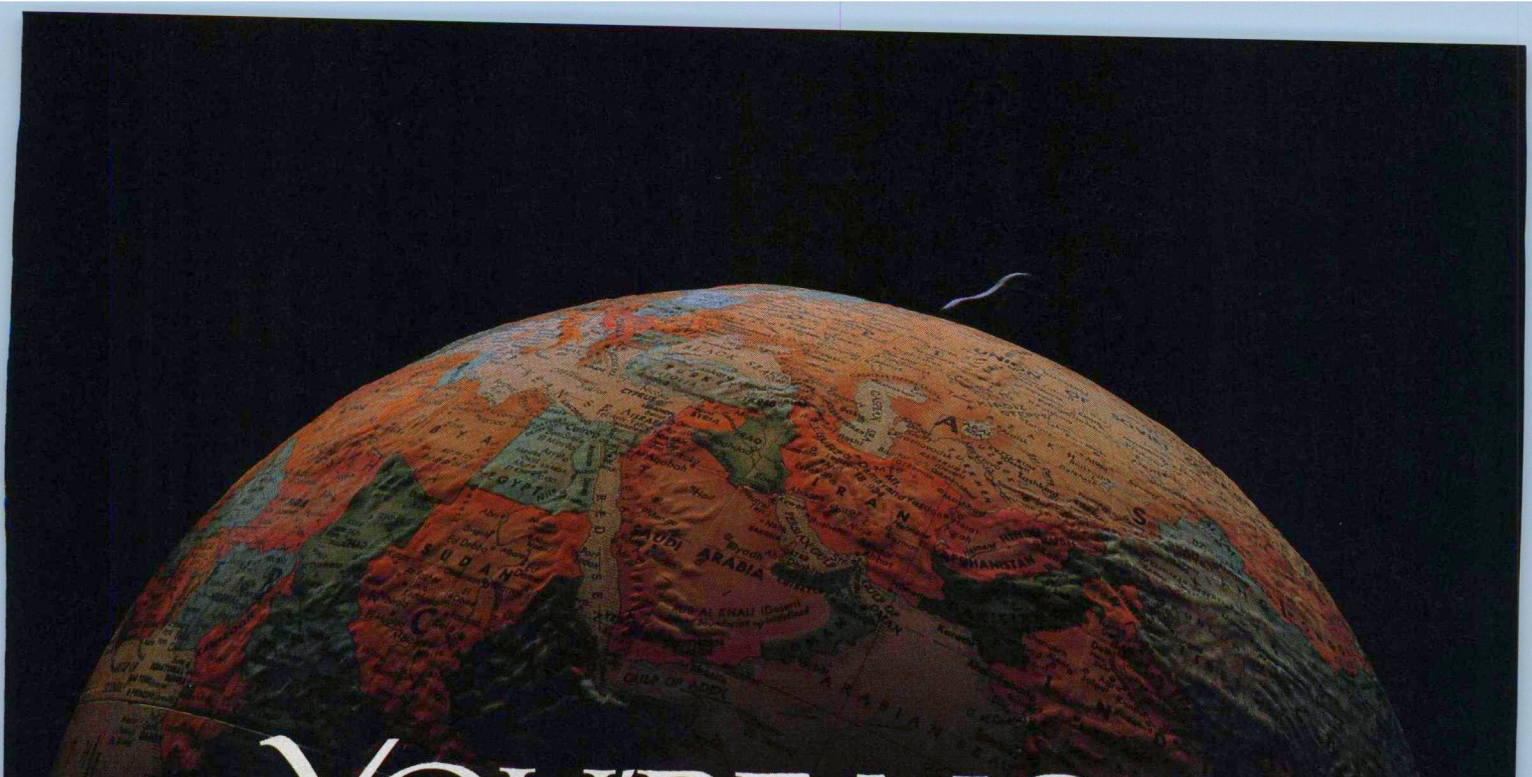
If you want another rectangle on the screen, you can either put new coordinates into MyBox or create a new instance (e.g., Rect YourBox). Because messages go to individual objects, each object keeps track of its own data.

If you are totally confused at this point, it is probably because object-oriented programming is so different from other types of programming. The reason object-oriented languages are so appealing for the Macintosh is because the Mac is loaded with lots of potential objects: windows, menus, icons, scroll bars, files, and the like. The implementers of Neon have taken most of the popular Mac goodies and created classes of objects around them. This means that Neon programmers have a head start in creating software with a Macintosh "feel."

Moving Forth

As far as object-oriented languages are concerned, Neon is a fallen angel. Rather than preserve the purity of object orientation to the point of utter nonsense, Neon incorporates objects for areas in which they make sense and follows a more traditional route in other areas; Neon is a hybrid language.

If its object nature has its roots in Smalltalk, the rest of Neon comes straight from Forth. Neon programmers work with a parameter stack



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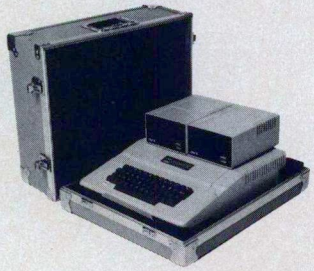

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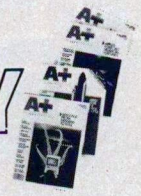

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and have access to all the commands and operations near and dear to the Forth programmer's heart.

Fortunately (for me), Neon also can use named parameters and local variables. For example, if you want to create a word that performs the operation $a^2 + b^2$ in pure Forth, you might do it this way:

```
: CALC ( a b -- result )
       DUP *
       SWAP
       DUP * +
;
```

DUP is a stack operation that duplicates the top element on the parameter stack, and SWAP interchanges the top two elements. To use this new word, you might enter

```
4 5 CALC . CR
```

and the computer would print 41 on the screen.

Because Neon can use named parameters, this same function can appear in a more readable form:

```
: CALC { num1 num2 -- result }
       num1 num1 * -> num1
       num2 num2 *
       num1 +
;
```

In this form, the curly brackets define the names and sequence of the parameters num1 and num2. The assignment operator (->) moves the intermediate result ($num1^2$) into num1 for storage.

Aside from presenting the challenge of Forth-type postfix notation, Neon words that use parameters and local variables are about as easy to read as procedures in Logo or Pascal are, especially when you're working with equations such as $(a + b + 6c) / (b + 3c)$, which are ugly to program in Forth. In Neon, you can create a word to solve this equation as follows:

```
: FORMULA { a b c / num den -- ans }
       a b +
       6 c * + -> num
       3 c *
       b + -> den
       num den /
;
```

In the first line, the names a, b, and c are input parameters, and the names to the right of the backslash (*num* and *den*) are local variables.

Neon has many features that make it an interesting language. For example, it allows programming at a higher level than is possible in pure Forth, while providing compatibility with Forth for those who want it. It provides access to the Macintosh Toolbox, making it easy to create programs with humane user interfaces. As an incrementally compiled language, it has great speed. Neon also allows programmers to create commercial software that they can sell without paying an additional licensing fee to Kriya.

Initial Hurdle

With these features, what are the flaws? The major flaw I have found is that the manual doesn't do enough to help you master the power of this language. Because each new class of objects inherits the methods of its parent class, you must understand what these methods do and how they work. The manual's descriptions lack sufficient detail. Each object description in the manual should contain a blow-by-blow account of each method in the class, followed by an example of its use. This amount of detail would make the manual much larger than it already is, but it would also make the language far easier to learn.

To be a good Neon programmer (according to Kriya), you should also be familiar with the contents of *Inside Macintosh* and know your way around Forth. I also suggest reading *SMALLTALK 80: The Language and Its Implementation*, by Goldberg and Robson (Addison-Wesley, 1983). My fear is that many programmers who could benefit from knowing Neon will find the need for this much research too high a price to pay.

What Neon needs is a good introductory book that explains the language in plain English. Then those of us who want to create great programs on the Macintosh won't have to look any further for a good language. ✚

Dr. David Thornburg has been active in the field of personal computers since 1978. He is the inventor of the KoalaPad touch tablet and is the principal designer of Muppet Learning Keys. He has written more than ten computing books.

PRODUCT INFORMATION

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MacTips

Suggestions from our readers

EXTENSION CABLES

Here's a simple tip that most Macintosh users don't know about. If you need to extend the connection for either of the Mac's serial ports or the mouse port, go to your local Radio Shack store and get a joystick-extension cable (RS p/n 276-1978, $3.99). The cable normally is used to extend joystick cables for Atari video games but uses normal DB-9 connectors. Just unplug your mouse and put the extension cable between the Mac and the mouse. The cable doesn't have connector screws, so you'll have to be careful with the cable so it doesn't fall out; but for $3.99 it beats any pricey extension cable!

P.N. Fiat
Merritt Island, FL

LOCKED IN THE TRASH CAN

Ever encounter the dialog box that proclaims That item is locked or in use, and can't be removed? This message appears when you try to put a file that is locked or part of the operating system into the trash can. Normally, if the file is locked (and not otherwise in use) you select Get Information from the File menu to lock or unlock the file. Once you've unlocked the file, you can trash it. Finder 4.0, however, lets you trash a locked file if you press and hold the Option key while dragging the file to the trash can. Once the file is in the trash can, be sure to delete it or start up a new application from another disk.

Tom Neudecker
Pittsburgh, PA

CUSTOM MACDRAW PATTERNS

I've found a fairly straightforward way to get additional patterns for use in MacDraw, otherwise available only by transferring finished MacDraw documents into MacPaint for enhancement with the pattern-editing ability of that program.

You open the PAT# resource on a copy of MacDraw, using the program ResEdit, available from users' groups or from CompuServe MAUG (see figure 1). When the PAT# window is open, opening the box that contains the original MacDraw patterns (by double-clicking) allows editing in a FatBits type of environment. When you have the patterns that you want, close the PAT# window and save the changes when the program asks you if that is what you want to do. The patterns that you have created will now be available from the MacDraw menu. You can maintain a library of these pattern files (each one takes up only about 600 bytes) and shuttle them in and out as necessary.

One thing to be aware of: A drawing made with custom patterns does not appear to retain those patterns when you view it from original MacDraw, although it does show them when you view it from the custom disk. The reason is the way the MacDraw documents are saved. MacDraw specifies only the positions of the patterns that created the picture. This situation really poses no problem, however: So that I'll have a reminder of which pattern I used in any given drawing, I simply record each pattern's filename or position number in the Get Info box associated with the MacDraw document after I create it. I can then easily use the correct pattern file when it is crucial.

I've found that this technique extends the usefulness of an already very useful program.

Neil D. Lewinski
Kalamazoo, MI

FULL-PAGE PICTURE

Drawing a full-page picture in MacPaint is a very tedious and annoying job, but there is an easier way to enlarge the picture than drawing it in MacPaint. The steps are as follows:

- While in MacPaint, put the rectangle around the picture and choose Copy from the Edit menu. Then close or quite the file.
- Open a MacWrite document and paste the drawing into the document by going to the Edit menu and clicking on Paste (⌘V).
- Magnify the drawing by clicking on the picture and dragging one of the boxes that appears on the bottom of the picture down the page.

Here are two other brief tips: There are several ways to eject disks. A faster way than ejecting a disk from each drive separately is to use the rectangle. You simply put the rectangle over the two disk icons and press ⌘E.

After you've scrolled through a long document, looking for errors or just reading it, and would like to return to your insertion point, just press the Enter key, and you're there.

Dean Wasylucha
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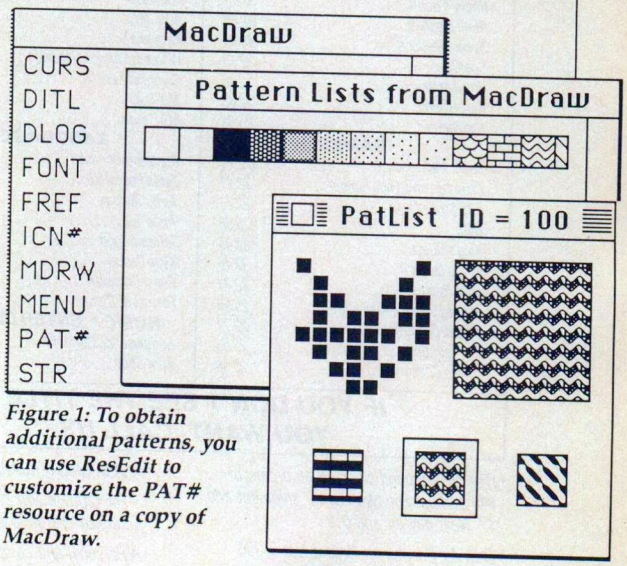

Figure 1: To obtain additional patterns, you can use ResEdit to customize the PAT# resource on a copy of MacDraw.

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An inexpensive balance-sheet program with impressive graphics capabilities

BUSINESS ANALYSIS WITHOUT PAIN

The average small-business owner who purchases a Macintosh may be a bit hesitant to take an expensive plunge into the world of integrated software and databases and may prefer a specific, task-oriented piece of software such as Profit Projections/Breakeven Analysis from Harris Technical Systems, Inc., which helps you produce business graphics.

This program stands out for its utility and ease of use. Although it's not as powerful or as multifaceted as Jazz, it seems like a good investment at $65.

When you start the program, a quick glance around the pull-down menus (see figure 1) reveals that it makes full use of the Macintosh user interface. It includes an extensive Help function with on-line documentation, detailed examples, automatic explanations, standardized forms, and the capability of starting a report from scratch. The File and Edit menus include all of the Macintosh's standard facilities, with a few extra specially tailored editing alternatives.

The View menu reveals the principal elements of the program, in six modules. The first, the Profit Projections Report, is the master module; the Breakeven Graph, Expense % Graph, and Profit Comparison Graph use information from this report to demonstrate critical data relationships. The program also has two modules, the Split Projections Report and the Split Projections/Breakeven Report, that handle what-if analysis. Profit Projections/Breakeven Analysis lets you integrate information from the various modules quickly, graphically, and easily.

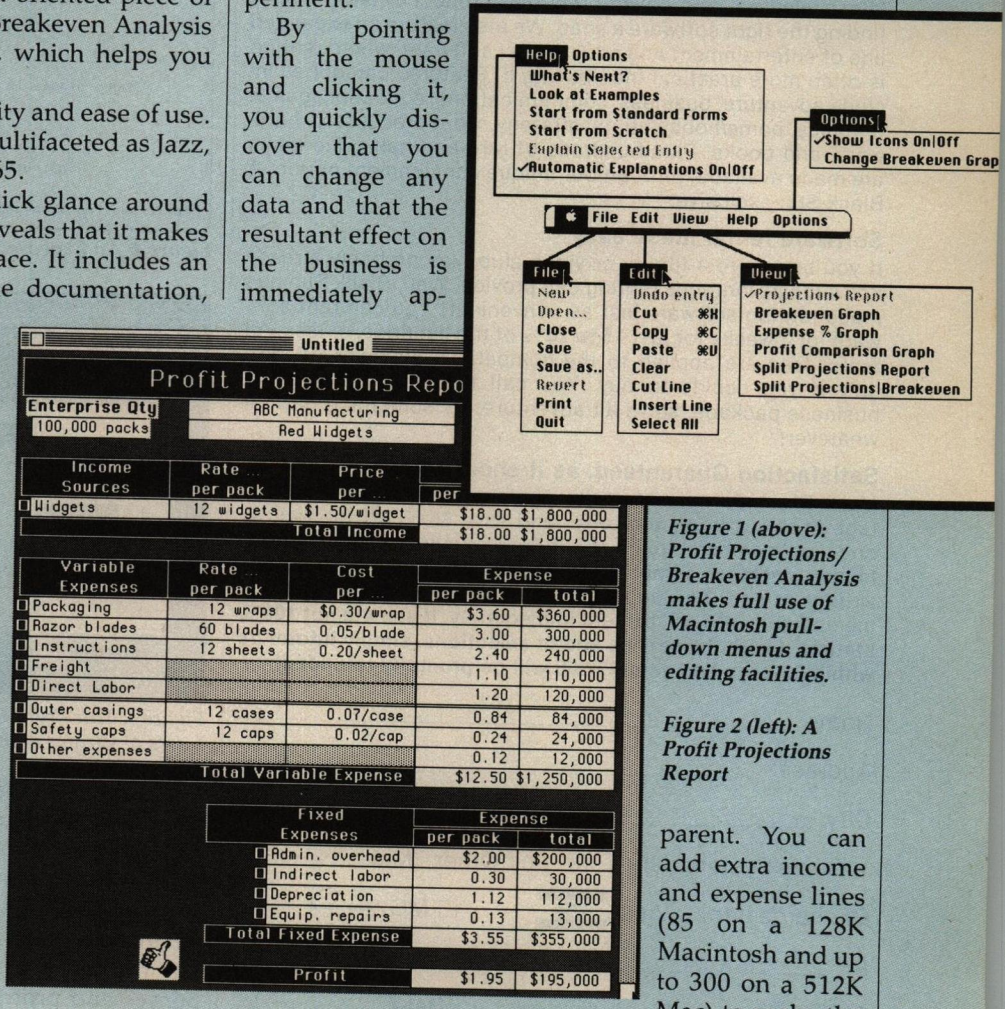

Figure 1 (above): Profit Projections/ Breakeven Analysis makes full use of Macintosh pull-down menus and editing facilities.

Figure 2 (left): A Profit Projections Report

The Profit Projections Report

The Profit Projections Report module, the first one you use, consists of a kind of spreadsheet template in five sections: Identification Data and Enterprise Quantity, Income Sources, Variable Expenses, Fixed Expenses, and Profit (see figure 2).

Essentially, this Profit Projections Report module lets a manager create a balance sheet for a particular enterprise and use what-if analysis to determine the overall effect of cost and pricing decisions. The inclusion of standard forms and examples for various businesses and the ease of data entry mean that the best way to learn this program is to put the manual away and experiment.

By pointing with the mouse and clicking it, you quickly discover that you can change any data and that the resultant effect on the business is immediately apparent. You can add extra income and expense lines (85 on a 128K Macintosh and up to 300 on a 512K Mac) to make the report as comprehensive as you want. Conveniently, this section does automatic calculations for you and computes the total income for each line. You might argue that all of these numbers could easily (for some) be put on a spreadsheet, but we've only scratched the surface of this remarkable program.

In addition to the Profit Projections Report, several other options are available: You can produce a Breakeven Graph (see figure 3), an Expense % Graph (figure

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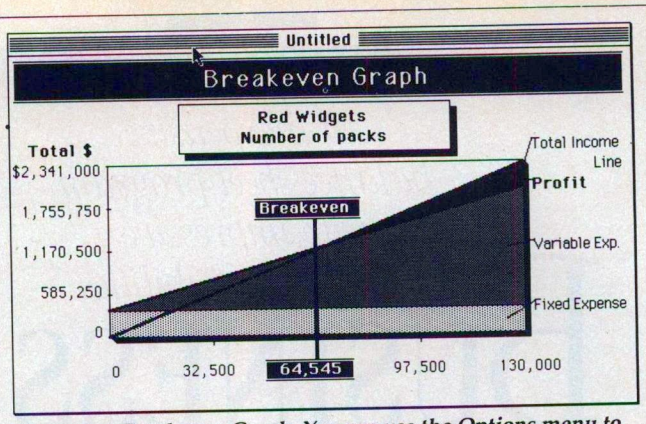

Figure 3: A Breakeven Graph. You can use the Options menu to change the graph units.

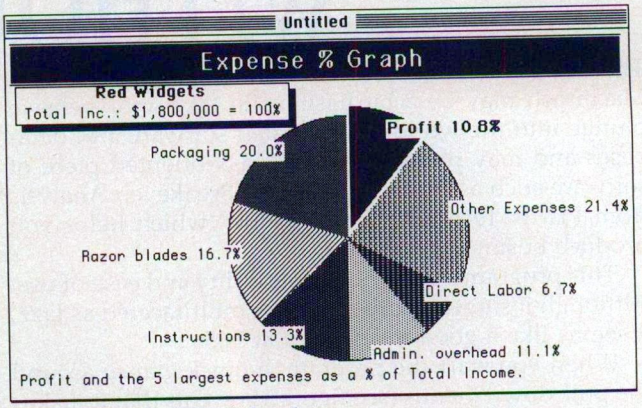

Figure 4: An Expense % Graph

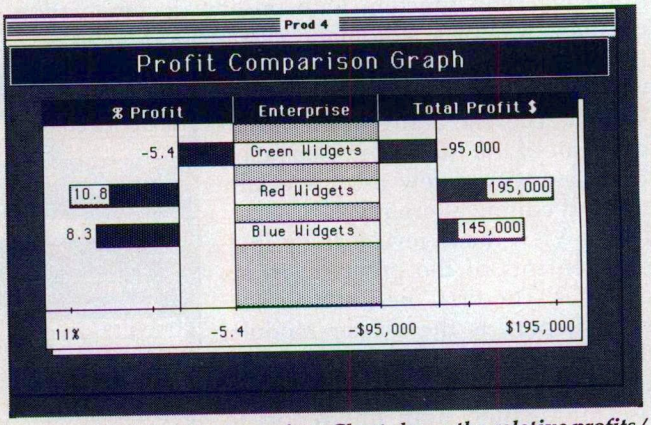

Figure 5: This Profit Comparison Chart shows the relative profits/losses of various enterprises in dollars and in percentages.

4), a Profit Comparison Graph (figure 5), a Split Projections Report (figures 6 through 8), and/or a Split Projections/Breakeven Graph.

The Breakeven Graph is a traditional straight-line diagram that shows how much of a commodity needs to be produced and sold at a given price to cover expenses, and the Expense % Graph is a pie chart that shows expenses and profits as percentages of total income. The Profit Comparison Graph uses information from a series of Profit Projection Reports in a bar-chart format to compare profits from various enterprises. The Split Projections Report and the Split Projections/Breakeven

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Mick O'Neil lives in England, where he is an educational-computing coordinator who supervises and administers computer-education programs at 17 U.S. Department of Defense schools in the United Kingdom.

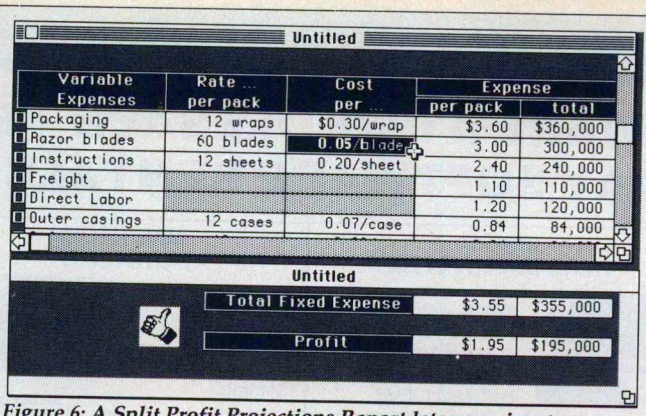

Figure 6: A Split Profit Projections Report lets you view two windows. Changes in one have an immediate effect on the other. In this example, the cost of razor blades is selected.

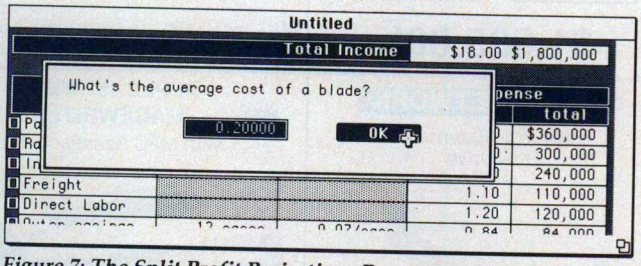

Figure 7: The Split Profit Projections Report continued: The cost per blade is changed to 20 cents.

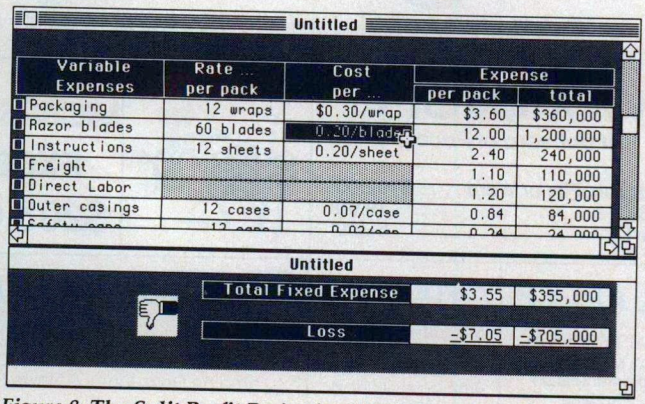

Figure 8: The Split Profit Projections Report continued: Once you've clicked on the OK block, the effect immediately registers on the Profit/Loss line. You can turn the thumbs-down icon off by using the Options menu.

Graph allow a manager to view different kinds of information simultaneously and to observe instantaneous change while answering what-if queries. The program produces all of the graphics displays with incredible speed and accuracy, and you can print them out.

Although the program comes with adequate documentation, I found it mainly unnecessary.

My cursory description of this program's powerful options might suggest that it is a complex program to use. In fact, it's not! It is an example of Macintosh software at its finest. ✚

PRODUCT INFORMATION

Profit Projections/Breakeven Analysis
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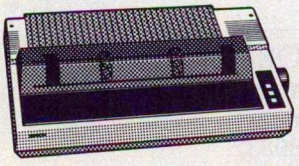

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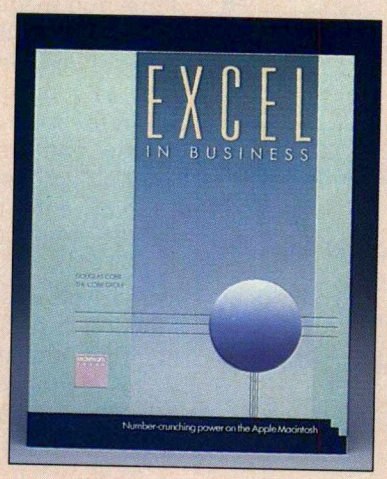
BOOK EXCERPT *BY DOUGLAS COBB*

Excel for the Macintosh is the state-of-the-art spreadsheet program available for any computer. One of the advanced features of Excel is the ability to create your own mathematical functions. This month A+ *is pleased to present an excerpt*



from Excel in Business *about creating user-defined functions.* Excel in Business, *published by Microsoft Press, was written by Douglas Cobb of the Cobb Group, well-known experts on Lotus 1-2-3 and publishers of the* Excellence *newsletter about Excel.*

EXCEL *User-Defined* FUNCTIONS

As you know, functions are special calculation tools that can be used in place of long, complex, or tedious formulas.

Although Excel includes more built-in functions than just about any other spreadsheet program, there are many functions that are not included in the program. For example, Excel does not include functions that compute depreciation. Nor does it include built-in functions for performing tax computations. If you perform these kinds of computations, you probably wish that there were built-in functions that you could use to streamline the process.

In addition, there are probably calculations that you perform regularly that could easily be condensed into functions. For example, suppose your company uses a complex mathematical formula for computing salespeople's commissions. Wouldn't it be convenient if Excel had a function called COMMIS that would perform this calculation for you? Or suppose your company has a stepped discount schedule. Wouldn't it be easy if there were a function called DISC that could compute the discount on any order for you automatically?

In Excel, it is possible to create user-defined functions like the ones we have just described. To create a user-defined function, you must write a special macro, called a function macro, that accepts information from the worksheet, performs calculations, and then returns the result to the worksheet. Most user-defined functions are simple. Some, however, can be pretty complicated.

As we have said, user-defined functions are a special type of macro. However, to create a user-defined function, you need to use only two macro commands: ARGUMENT and RETURN. The ARGUMENT function allows you to define the arguments that your user-defined function will use. The RETURN function returns the result of the user-defined function to the worksheet.

The best way to see how these functions work is to build a simple example. Suppose your company pays a commission of 10 percent on all sales. Each week, the payroll department has to compute the commission on each salesperson's sales for that week. The worksheet in figure 1 shows the weekly sales of four salespeople. You need to compute their commission for this week. Let's create a user-defined function to perform this task.

To begin, pull down the File menu, choose the New . . . command, and double click the Macro Sheet option. Like all other macros, user-defined functions are created and stored on macro sheets.

When the new macro sheet appears, select cell A1 and type COMMIS. (This first step is not absolutely required, but it is a good idea. We'll show you why in just

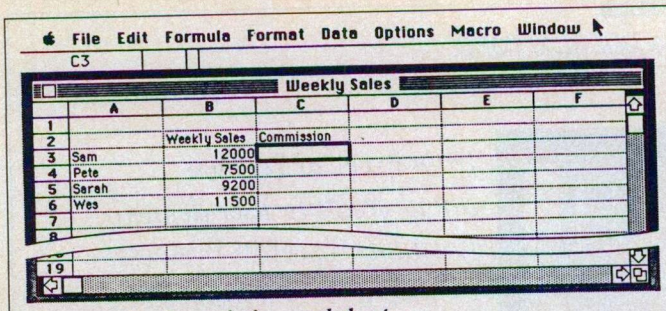


Figure 1: The Commission worksheet

a paragraph or two.) Next, select cell A2 and enter the function

=ARGUMENT("SALES")

Now, select cell A3 and enter the formula

=Sales*0.1

Finally, enter the function

=RETURN(A3)

in cell A4. Figure 2 shows the macro sheet at this point.

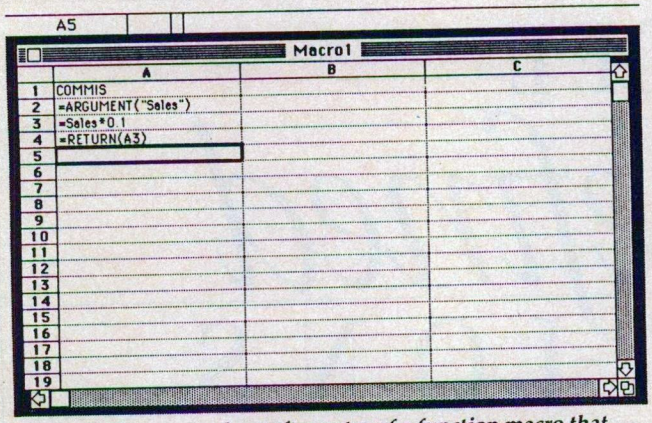


Figure 2: The macro sheet after entry of a function macro that calculates salespeople's commissions

Next, you must give this function macro a name. As with all other macros, the name of a function macro is just a range name that you assign to the first cell in the macro. In this case, the first cell in the macro is cell A2 (the name in cell A1 isn't technically a part of the macro). To name this cell, click the cell to select it, and then choose the Define Name . . . command from the Formula menu. When you choose this command, Excel displays the dialog box shown in figure 3. Notice that the

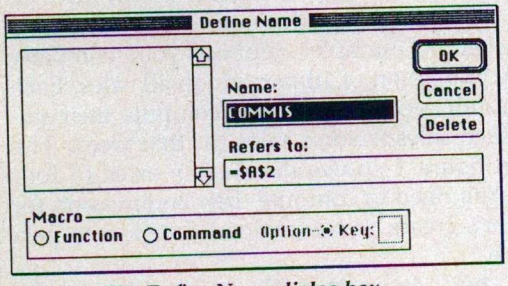


Figure 3: The Define Name dialog box

Refers To field contains the coordinates of the selected cell, A2, and that the Name field contains the label from cell A1, COMMIS. To tell Excel that the macro you are naming is a function macro, click the Function button. Then, to accept the default name, COMMIS, just click the OK button.

Excel always offers you the option of using the label in the cell above or to the left of the cell that you are naming as the name for that cell. Thus, by entering the label COMMIS in cell A1, you killed two birds with one stone: You made the job of naming the function easier, and you created a visual reminder of the name in the macro sheet. We recommend that you always enter the name of your function macros in the cell above the first cell in the macro.

Now you are ready to use the function you've defined. To do this, select the worksheet and then click cell C3. Now enter the function

=Macro1!COMMIS(B3)

in that cell. Notice that the name of this user-defined function includes two parts: The first part, Macro1!, identifies the macro sheet that contains the function that is identified by the second part of the name, COMMIS. The function's argument, B3, identifies the cell you want the function to operate on.

As shown in figure 4, when you press Enter to lock in this function, it will calculate and return the correct commission for the sales amount in cell B3: 1200.

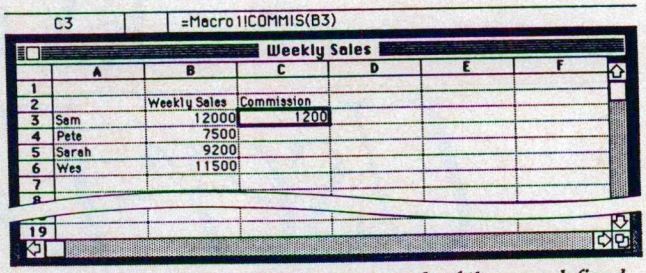


Figure 4: The worksheet, showing the result of the user-defined function after it has been locked in

Let's consider what happens when you enter this formula in the worksheet. When you press Enter, Excel immediately looks on macro sheet Macro1 for the cell named COMMIS (cell A2). Then it begins processing the formulas in cells A2, A3, and A4 of the macro sheet, one at a time. The formula in cell A2

=ARGUMENT("Sales")

assigns the name Sales to the value in cell B3, 12000. Remember that B3 is the cell we used as the argument for the function in cell C3. In effect, Excel "passes" the value from cell B3 to the sheet Macro1, where it is stored under the name Sales.

Next, the formula in cell A3

=Sales*0.1

multiplies the value of Sales, 12000, by 0.1. Finally, the formula in cell A4

=RETURN(A3)

returns, or "passes," the value of the formula in cell A3, 1200, back to C3, the cell in Worksheet1 that contains the COMMIS function.

To complete the job, you can use the Fill Down command to copy the user-defined function in cell C3 into cells C4, C5, and C6. Since the reference to cell B3 in the original function is a relative reference, it will change as this formula is copied into the new cells so that the formula in cell C4 will be

=Macro1!COMMIS(B4)

and the formula in cell C5 will be

=Macro1!COMMIS(B5)

When you perform this copy, Excel will calculate the function macro once for each of the cells in the fill range. Figure 5 shows the result.

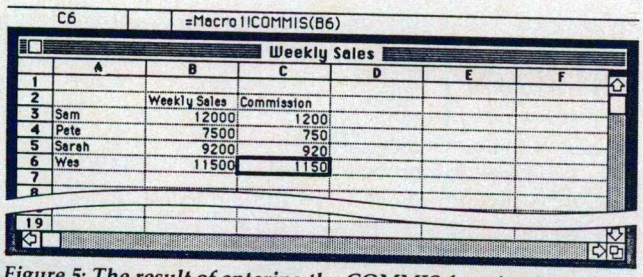


Figure 5: The result of entering the COMMIS function into cells C4:C6 with the Fill Down command

Now suppose you need to change the values in cells B3:B6, to 11000, 8200, 7600, and 13000. As you might expect, Excel will automatically update the commission calculations in cells C3:C6 as you enter the new sales figures. Figure 6 shows the result.

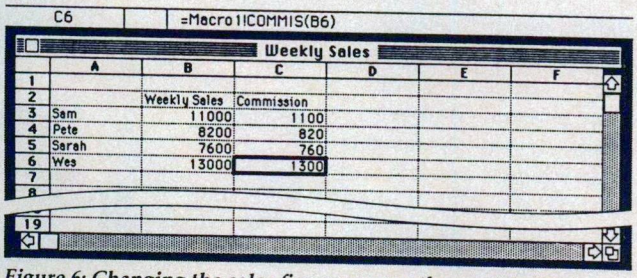


Figure 6: Changing the sales figures causes the user-defined function to update the commission amounts in cells C3:C6.

Obviously, this first example is trivial. You could accomplish the same thing more easily by entering the formula

=B3*0.1

in cell C3 and then copying that formula into cells C4:C6. But when the computations become more complex, user-defined functions can be real timesavers. In a page or two, we'll expand on this example to make the advantages of user-defined functions clear.

Function Macro Rules

Although the example we have just looked at is very simple, it illustrates many of the characteristics of all function macros. First, every function macro must include at least one ARGUMENT function and a RESULT function. Most function macros will also include one or more formulas, like the one in cell A3 in the example, that perform computations using the arguments.

The order of the functions in a user-defined function macro is very important. The macro must begin with one or more ARGUMENT functions and must end with the RETURN function. The formulas that actually do the work of the function must be between the ARGUMENT functions and the RETURN function. If these formulas are below the RETURN function, the user-defined function will not calculate properly.

When we say that the ARGUMENT function in the example assigns the name Sales to the value 12000, we mean just that. If, after you use the macro by entering the user-defined function in the worksheet, you select the macro sheet and choose the Define Name . . . command from the Formula menu, you'll see the name Sales in the list of names. If you select this name, you'll see the value 12000 in the Refers To field.

Many times, you will begin your function macro in cell A1 in a blank macro sheet, as we did in the example. There is no restriction on the location of the macro in the macro sheet, however. You could just as easily enter this macro in cells Z100 to Z103, and assign the name COMMIS to cell Z101.

You can use only macros that are located on open macro sheets. If you close a macro sheet that contains a function macro that is referred to by user-defined functions in open worksheets, the value of those functions will change to #REF!. To recompute the functions, you must reopen the macro sheet.

Making a Change

Let's expand our simple commission calculation to see how function macros can be edited. Suppose your company uses a more complex commission formula: Salespeople receive a 10-percent commission if they sell under $5000-worth of goods, an 11-percent commission if they sell more than $5000-worth but less than $15,000-worth, and a 12-percent commission if they sell more than $15,000-worth. Let's modify our simple function to perform this new calculation.

To do this, select the macro sheet Macro1, select cell A3 (the cell that contains the commission calculation), and enter the formula

=IF(Sales>15000,Sales*0.12,
IF(Sales>5000,Sales*0.11,Sales*0.1))

That's all there is to it: The user-defined function will now compute commissions using the new formula.

If you switch back to Worksheet1, however, you'll see that the values in cells C3 to C6 have not changed. Excel will not update the user-defined functions in your worksheet when you make a change to the macro that computes the function. To update the results in Worksheet1, you must "re-enter" the user-defined functions in cells C3:C6.

Of course, you could re-enter the functions manually by selecting each of the cells and retyping the function. Fortunately, there is an easier method. You can select each of the cells in the range, one by one, and, while the cell is selected, click in the formula bar and then immediately click the enter box. "Editing" each cell in this way will update the functions. Figure 7 shows the worksheet after the functions have been updated.

Notice that cell A3 in this function macro contains a complicated IF function. These functions behave exactly the same way in a macro sheet as they do in a worksheet, and you can use them to perform calculations or make decisions in your function macros. ✚

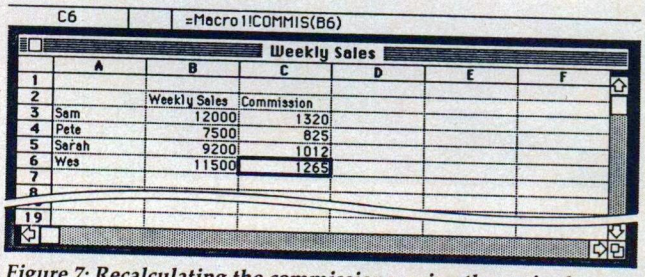


Figure 7: Recalculating the commissions, using the revised function macro

From Excel in Business, *Microsoft Press, Copyright © Douglas Cobb, 1985. All rights reserved.*

Pipeline

II SERIES

AST BOARDS FOR THE APPLE IIe

AST Research has announced four new products for Apple IIe computers.

SprintDisk, which also works with the Apple II Plus, is a solid-state memory-expansion card that combines an electronic disk and disk-caching software to speed the operation of spreadsheet word-processing, and database-management software. The card's standard configuration supports up to 1 megabyte of RAM and includes SprintCache, a fast cache-software package. An optional piggyback board that can expand the card's memory capacity to 2 megabytes will be available soon.

An addition to the company's MicroStor line of mass-storage devices is a 20-megabyte hard-disk/tape backup subsystem. The line now offers 10- or 20-megabyte disk and tape all-in-one units, as well as 10- or 20-megabyte tape or hard-disk-only configurations. The MicroStor products use 3½-inch Winchester and tape drives and are compatible with software written for the ProDOS, DOS 3.3, Apple Pascal, and CP/M operating systems.

MegaRamPlus is a single-slot card that allows users to add up to 1 megabyte of main-board RAM. It comes with MegaRamCache, a caching-software package designed to boost the speed of existing applications, and a suite of RAMdisk and memory-addressing expansion-software utilities. Available options include a piggyback card for additional RAM and an RGB interface to support high-resolution graphics. *(List Price: SprintDisk [256 K], $295; MicroStor [10 megabytes with disk and tape], $1995; MicroStor [20-megabyte disk only or tape only], $1295; MicroStor [20 megabytes with disk and tape], $2595; MicroStor [20-megabyte disk only or tape only], $1595; MegaRamPlus [64K], $195, MegaRamPlus [256K], $295)*

Requires: Apple IIe

AST Research, Inc.
2121 Alton Avenue
Irvine, CA 92714
(714) 476-3866

CIRCLE READER SERVICE NO. **500**

MicroStor's 20-megabyte hard-disk/tape backup subsystem

MAC

INTERLACE

An integrated software package for the Macintosh, Interlace combines a fully relational database and the calculation ability of a spreadsheet. The package was designed to enable users who have no programming knowledge to perform such complex tasks as "what if" tax models, portfolio analysis, client billing, cash-flow management, and list and mail-merge processing with calculated data. Features of the package include a visual database design, a "what you see is what you get" report- and form- layout ability, and a comprehensive set of non-procedural relational-database operations. *(List Price: $139)*

Requires: Macintosh

Singular Software, Inc.
5888 Castano Drive
San Jose, CA 95129
(408) 446-0207

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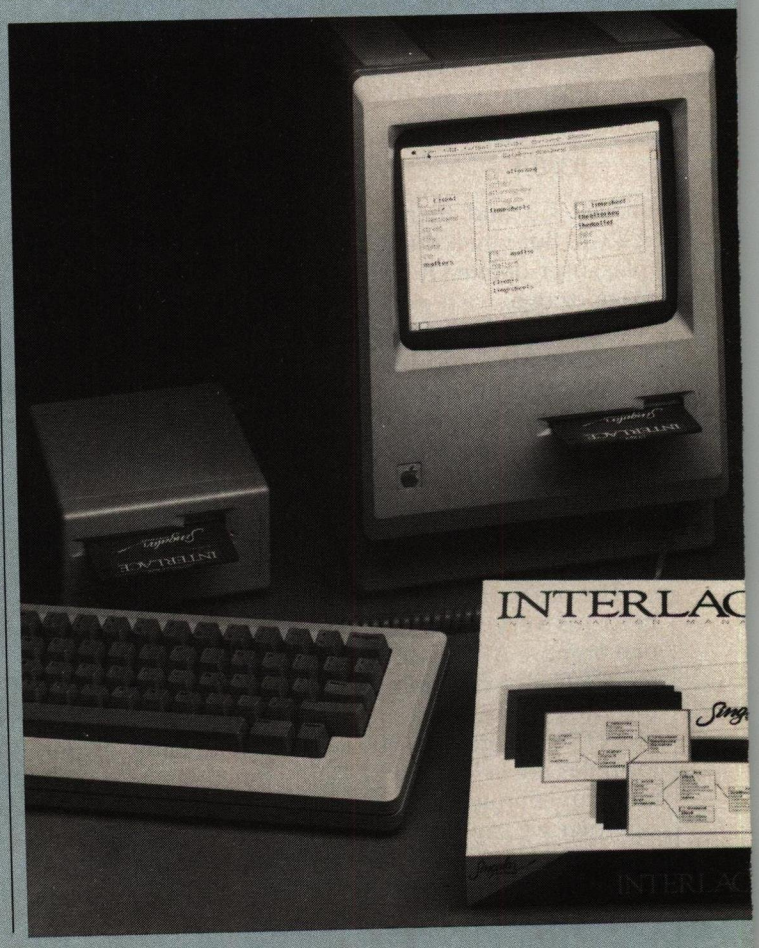


BUSINESSWORKS

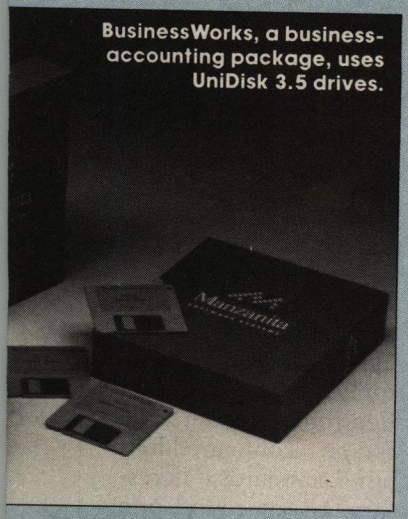
Designed for Apple Computer's 3½-inch disk drives on Apple IIe or IIc computers, BusinessWorks is a business accounting system that is made up of six modules—System Manager, General Ledger, Accounts Payable, Accounts Receivable, Inventory Control, and Payroll. The modules can work together as an integrated system or can stand alone.

The only required module is the System Manager, which provides password security, company information, utilities, and a mailing-label program. The BusinessWorks system uses the same file-card screens and editing keys as AppleWorks does and has the ability to transfer financial information to AppleWorks database and spreadsheet files. *(List Price: System Manager, $95; Payroll, $445; other modules, $395 each)*

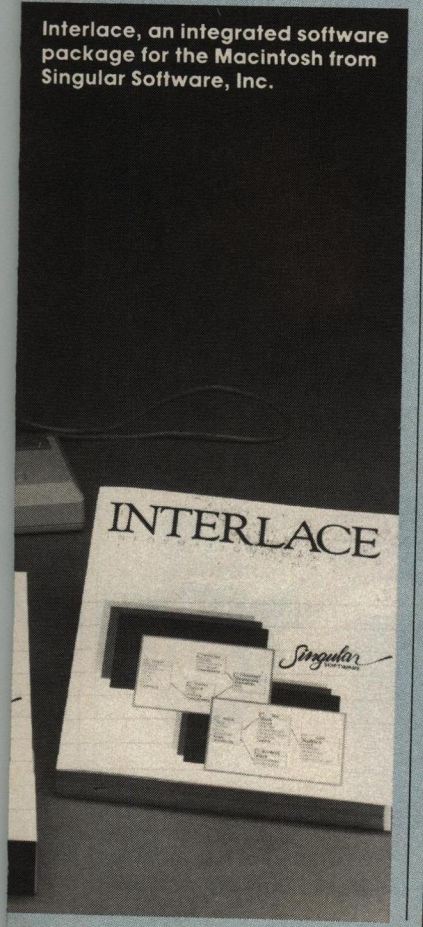
Requires: Apple IIe or IIc; 128K RAM; 80-column card; two UniDisk 3.5 drives or one UniDisk 3.5 and one ProDOS-compatible hard-disk drive

Manzanita Software Systems
One Sierra Gate Plaza
Suite 200-A
Roseville, CA 95678
(916) 781-3880

CIRCLE READER SERVICE NO. **502**



BusinessWorks, a business-accounting package, uses UniDisk 3.5 drives.



Interlace, an integrated software package for the Macintosh from Singular Software, Inc.

SUPER CRUNCH

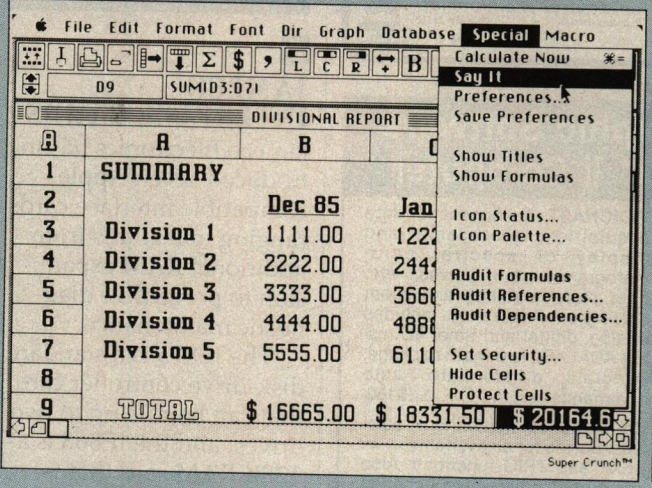
Paladin Software has released Super Crunch, a more powerful version of its Crunch spreadsheet for the Macintosh 512K. The package also offers graphics, data management, and note-keeping capabilities. Super Crunch has a variety of new features including macros; a 3-D worksheet; powerful database features; design-your-own icons; and speech output. Registered owners of Crunch can receive Super Crunch free of charge. *(List Price: $295)*

Requires: Macintosh 512K

Paladin Software Corporation
3255 Scott Blvd.
Suite 7C
Santa Clara, CA 95054
(408) 322-8283

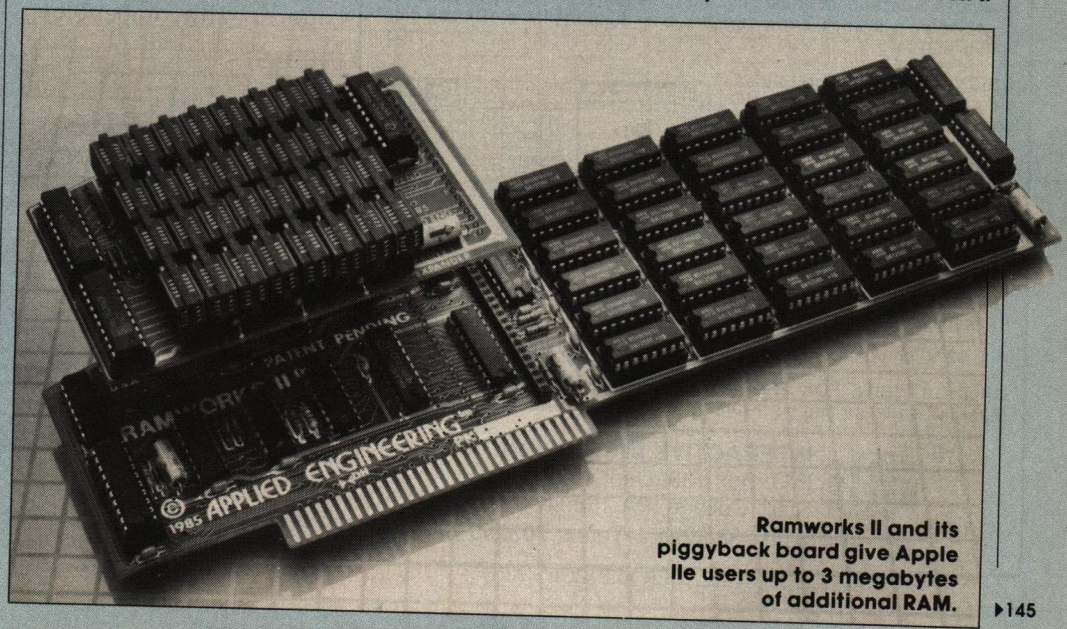
CIRCLE READER SERVICE NO. **503**

Paladin Software's Super Crunch, a more powerful version of the Crunch spreadsheet that offers a variety of new features.



RAMWORKS II

The Ramworks II expansion board offers Apple IIe users up to 3 megabytes of additional RAM. The basic board contains 1 megabyte, but it can also hold a



Ramworks II and its piggyback board give Apple IIe users up to 3 megabytes of additional RAM.

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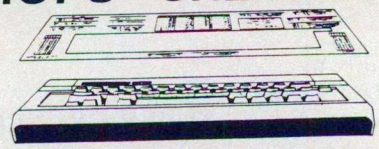

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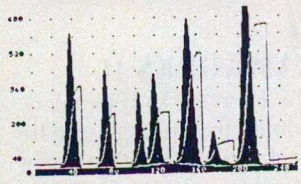

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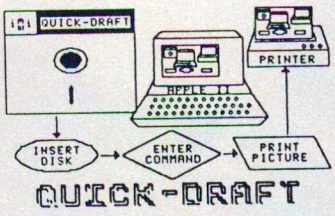

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piggyback board, which is half the size of the main board and holds twice the memory, to provide 3 megabytes. The piggyback board contains 64 256-kilobit dynamic-RAM chips in small in-line packages. In addition, Ramworks II provides users with a built-in 64K print buffer. *(List Price: 3-megabyte version, $1699; 1-megabyte version, $389)*

Requires: Apple IIe

Applied Engineering
P.O. Box 798
Carrollton, TX 75006
(214) 241-6060

CIRCLE READER SERVICE NO. **504**

HARDWARE

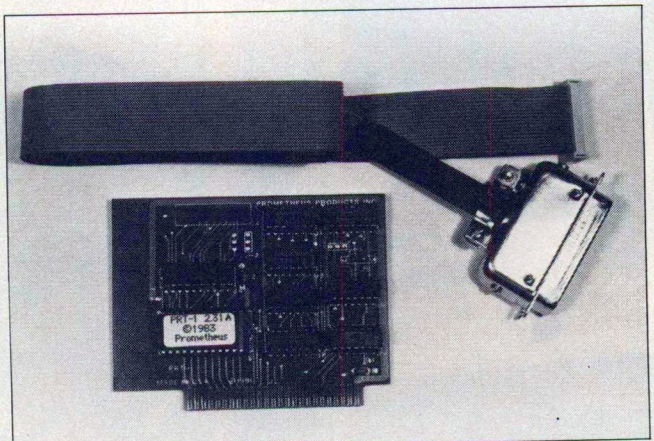
II SERIES

JAMECO INTERFACE CARDS

Jameco Electronics has introduced seven Apple-compatible interface cards ranging in features from additional RAM expansion to preventive diagnostic maintenance.

The JE875 is a standard disk-drive controller card that can handle up to two drives, and the JE868 is a 128K RAM card that is functionally compatible with the 16K Apple II Language Card. The JE868 features a DOS relocator and comes with five programs—a memory-management system; utilities; diagnostics; demos; and RAMdisk emulators for DOS 3.3, CP/M, and Apple Pascal.

Also for the Apple II, II Plus, or IIe, are the JE877, JE880, and JE883 cards. The JE877 serves as a diagnostic tool, an assurance/maintenance tool, and a dual disk-drive controller. The JE880 provides an intelligent printer interface to most popular dot-matrix graphics printers. It comes configured for the Centronics standard but can be reconfigured for other standards if necessary. Advanced text-printing features include video-screen echo on or off, auto/disable line feed after carriage return, set/clear the eighth bit of output data, and more. The JE883 provides users with up to 64K of additional or buffered memory and needs a parallel card for operation. It includes a standard parallel input with both parallel and serial buffered outputs.



Seven new Apple-compatible interface cards are available from Jameco Electronics.

The JE860 RAM card lets users expand the RAM of the Apple II and II Plus from 48K to 64K. It is fully compatible with Microsoft's Softcard and can run Applesoft, DOS, CP/M, or Pascal. The JE864 is an extended 80-column and 64K RAM card that effectively doubles the display and memory capacity of the Apple IIe. *(List Price: JE875, $49.95; JE868, $119.95; JE877, $69.95; JE880, $59.95; JE883, $79.95; JE860, $39.95; JE864, $69.95)*

Requires: Apple II, II Plus, or IIe

Jameco Electronics
1355 Shoreway Road
Belmont, CA 94002
(415) 592-8097

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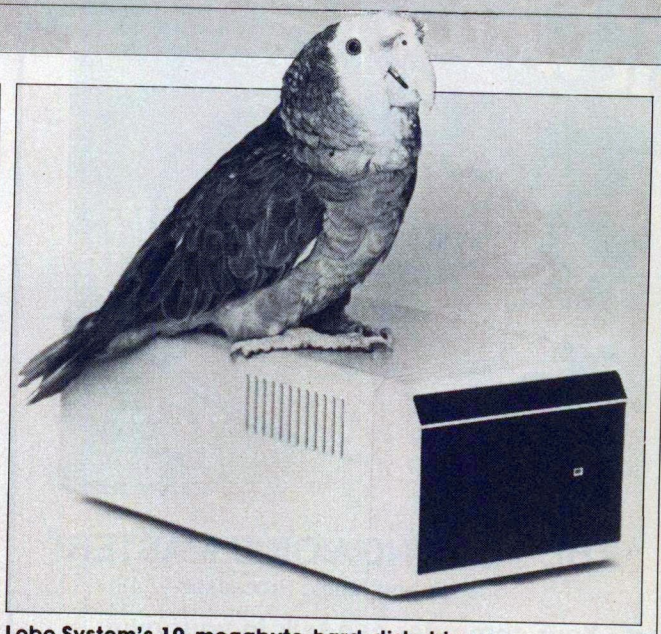
10-MEGABYTE HARD DISK

Lobo Systems has released a sealed 10-megabyte hard disk that has a 99.92-msec average positioning time. The system is reliable, having a mean time between failures of 11,000 hours. The read/write heads do not touch the disk surface, thus eliminating wear. The disk rotates at high speed—3600 revolutions per minute—on precision bearings and is able to read and write at a rate of 5 million bits per second. The drive can be partitioned in increments of 64K, and each partition can act as a separate drive and can contain a separate operating system. *(List Price: $1395)*



Lobo System's 10-megabyte hard-disk drive

Requires: Apple II, II Plus, IIe, or IIc

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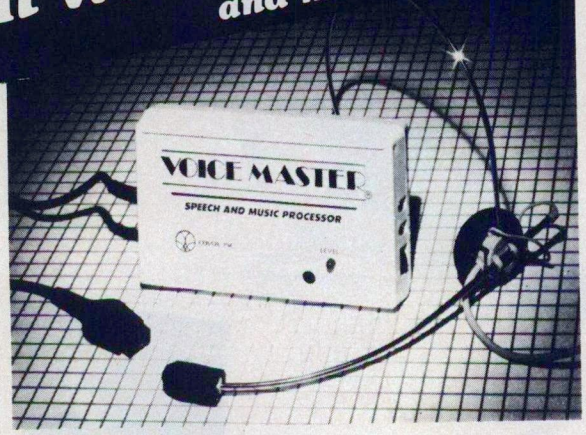

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MONEYLINK

Bank of America and Monogram have introduced a new program, Moneylink, that enables the bank's customers to pay bills and track expenditures in one easy step. The program provides an electronic bridge between BofA's HomeBanking service and the financial-management system Dollars and Sense. Moneylink updates HomeBanking transactions automatically on both HomeBanking accounts and Dollars and Sense records and also balances the customer's electronic checkbook.

HomeBanking enables users to pay a variety of bills, transfer money between accounts, make balance inquiries, and review checking-account statements. Customers can also schedule payments up to one month in advance, cancel prescheduled transactions, review transactions for the past three months, and communicate with the bank via electronic mail.

Designed for home and small-business use, Dollars and Sense can keep records in five categories—assets, liabilities, expenses, income, and checking—and can work with Forecast, a tax-estimating and -planning program. *(List Price: Moneylink, $49.95; HomeBanking Service, $8 per month; Dollars and Sense—II, II Plus, and IIe, $100; IIc, $119.95; Macintosh, $149.95)*

Requires: Apple II, II Plus, IIe, or IIc or Macintosh

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San Francisco, CA 94137
(800) 792-0808

Monogram
8295 South La Cienega Blvd.
Inglewood, CA 90301
(213) 215-0355

CIRCLE READER SERVICE NO. **507**

II SERIES

GRAPHICS EXPANDER

Graphics Expander, Volume 1, is designed for use with Brøderbund Software's The Print Shop, with which you can create banners, cards, signs, and letterheads. Graphics Expander contains more than 300 graphics for use either alone or in combination with The Print Shop's own 60 graphics. In addition, the program lets you use art from sources such as the Koala-Pad or a digitizer. *(List Price: $39.95)*

Requires: Apple II Plus, IIe, or IIc; 64K RAM

Springboard Software, Inc.
7808 Creekridge Circle
Minneapolis, MN 55435
(612) 944-3915

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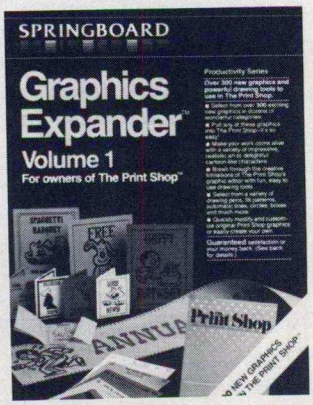
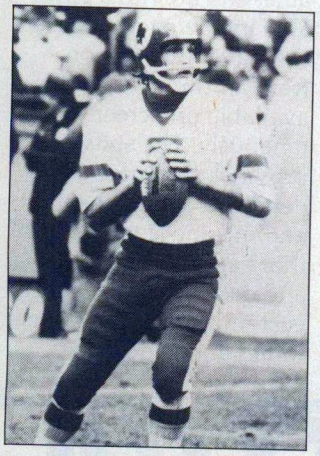


Graphics Expander, for use with The Print Shop

AVANT-GARDE ACHIEVEWARE

Avant-Garde has released two new programs in its AchieveWare line of computerized training tools.

In Joe Theismann's Pro Football, the Super Bowl quarterback teaches you expert quarterbacking



Joe Theismann explains expert quarterbacking techniques in Pro Football from Avant-Garde.

techniques, improves your football skills, and helps you understand the finer details of the game. Live-action diagrams illustrate play, and colorful close-up animation highlights formations, running and passing techniques, quarterback position, stance, cadence, and strategy. Theismann also walks you through an illustrated library of equipment, describes players' positions, gives advice on training, and more. When you're ready, you can play an action-packed game that features you as the quarter-back.

In Chris Evert-Lloyd Tennis, Evert-Lloyd is your personal tennis coach, demonstrating grips, strokes, game strategy, and specialized exercises to teach you both the fundamentals and finer points of winning tennis. The program also helps you learn the rules and gives you pointers on choosing tennis equipment. Again, all demonstrations are displayed with live-action graphics, and you can test your skills in a match between you and your computer. *(List Price: $39.95 each)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM

Avant-Garde
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By configuring AppleWorks spreadsheets to prepare personal federal income-tax returns, Taxworks emulates conventional tax-preparation programs. The software template uses AppleWorks to perform calculations for most-often-used tax forms, advance relevant data to other forms, and print out tax schedules that can be submitted directly to the IRS. Users can also make alternative computations to find minimum taxes, and the program can recompute 1985 taxes to see how proposed legislation would affect users' tax bills. *(List Price: $19.95 plus $2 postage and handling)*

Requires: Apple II Plus, IIe, or IIc; 128K RAM; AppleWorks

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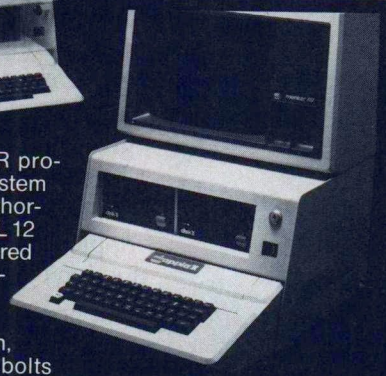

The APPLECENTER protects your Apple II system from theft and unauthorized use. The MODEL 12 features a built-in filtered cooling fan plus state-of-the-art voltage surge protection. All metal construction, the APPLECENTER bolts easily to the worksurface (or use optional adhesive plate) to secure your Apple II or IIe, 2 disk drives or Duodisk. You control the use of your Apple with the key locking on/off switch. Our MODEL 10 is compatible with side mounted fans.

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1224 Mariposa, San Francisco, CA 94107
(415) 861-2223

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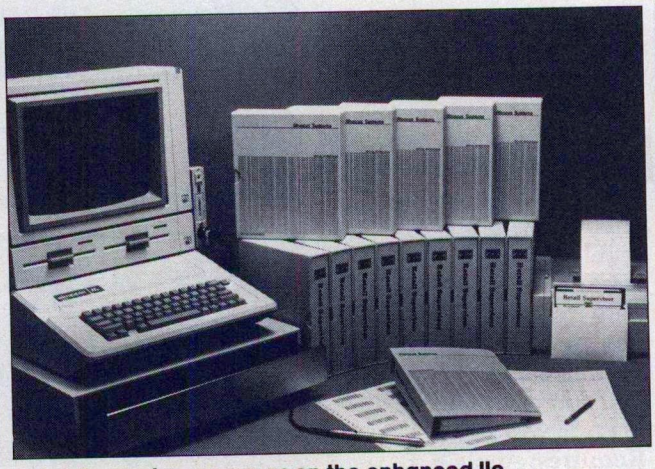
II SERIES

RETAIL SUPERVISOR FOR ENHANCED IIe

Abacus Systems' Retail Supervisor, which provides retailers with a computerized point-of-sale and inventory-control system, is now available in a version for the enhanced Apple IIe. Point-of-sale functions include handling of all types of tender, item credits and receipt debits, automatic update of inventory, price lookup, item inquiry, and printing of sales receipts. In addition, the system can read and print bar-code price labels. The system's inventory-control functions can work with LIFO, FIFO, or moving-average inventory methods. Reports include Sales-in-Detail, Sales-in-Summary, Product Performance, Wholesale Cost/Quantity, Retail Price Listing, and more. *(List Price: $1195)*



Retail Supervisor now runs on the enhanced IIe.

Requires: Enhanced Apple IIe, Extended 80-Column Card, two disk drives
Abacus Systems
707 Cass Street
La Crosse, WI 54601
(608) 785-1740
CIRCLE READER SERVICE NO. **511**

MAC

PLAINS & SIMPLE

Plains & Simple emulates the one-write bookkeeping and accounting system, making it easy for Mac users to move from a manual to an automated accounting system. The product includes general ledger, accounts receivable, and accounts payable in one package; users can have information from all three functions available on-screen simultaneously. The software provides summary and detailed balance sheets and income statements, a trial balance, summary and detailed aging reports, customer statements, customer and vendor lists,

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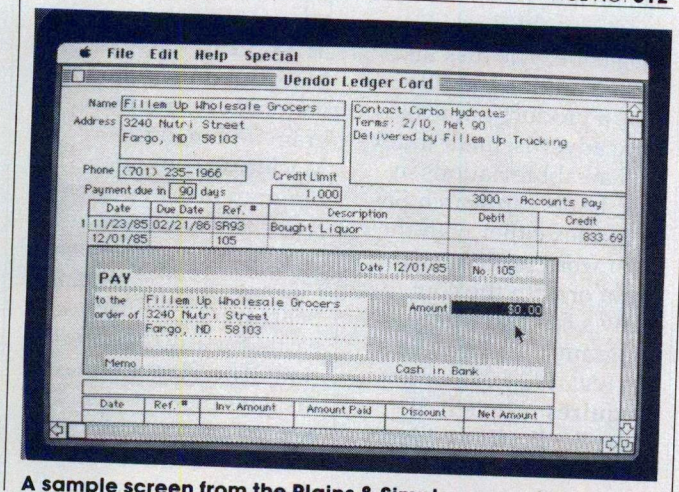
mailing labels, and telephone cards. In addition, it has a Cash-Flow Calendar that permits users, at a glance, to project future positions based on their anticipated cash flows. *(List Price: $695)*

Requires: Macintosh 512K, two disk drives, printer
Great Plains Software
1701 S.W. 38th Street
Fargo, ND 58103
(701) 281-0550
CIRCLE READER SERVICE NO. **512**



A sample screen from the Plains & Simple accounting system

SERIES

PROFILER 2.1

An advanced file-management program, ProFILER 2.1 provides users with a large storage capacity, speed, ease of use, and flexibility. Users can store up to 1500 records on each floppy disk or up to 65,000 records on a hard disk and can design custom forms in less than 15 minutes. Each form can have up to 250 fields. It incorporates a full-screen editor, and its report generator, which lets users handle math operations up to ten significant digits, also includes an Apple Writer II mail-merge interface. Other features include the ability to work easily with word processors, store multiple forms per disk, provide multiple index files per form, and display a directory of data files.

Also available are several enhancements. ProFILER Data Conversion automatically converts multiple PFS files directly to a single ProFILER data disk, without users having to enter additional data. The ProFILER Utility program reads AppleWorks database files directly, merges two ProFILER data files into one, and transfers or deletes selected file data. It also reads standard text files into ProFILER and transfers form designs to a second file when necessary. Finally, a separate Label Utility program can

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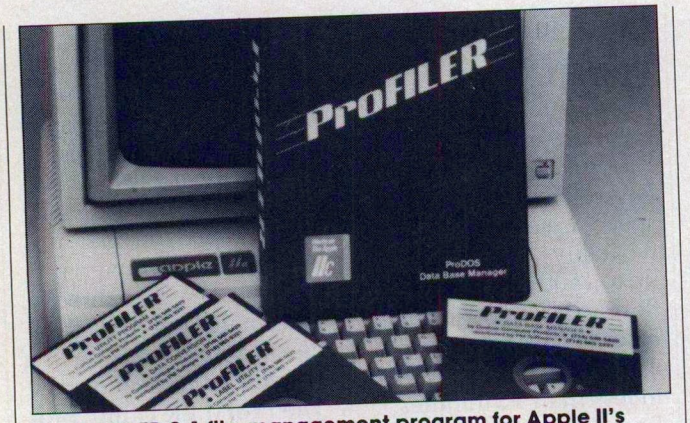

The ProFILER 2.1 file-management program for Apple II's

print labels in any of the popular formats, make multiple copies of each label, suppress blank lines, and allow printing of header/trailer lines on each label. *(List Price: ProFILER, $89.95; ProFILER Data Conversion, Utility Program, $39.95 each; Label Utility, $29.95)*

Requires: Apple II, II Plus, IIe, or IIc; 64K RAM; ProDOS

PM Software
P.O. Box 1788
Huntington Beach, CA 92647
(714) 963-2221

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Requires: Apple II, II Plus, IIe, IIc, III, or Macintosh

Fastfind Company
28503 Coveridge Drive
Department A
Rancho Palos Verdes, CA 90274
(213) 544-2350
(213) 377-0804

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MACSTRONOMY

MacStronomy is an observational astronomy program designed for Macintosh computers. The program displays three types of windows. The Sky Window presents maps of the sky as it appears from any place on earth, for any date and time. The Planet Window displays maps of the planets in their orientations around the sun for any date, and the Description

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F	DOUBLE STRIKE	L	BIDIRECTIONAL

SOME COMBINATIONS

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N	DOUBLEWIDE EMPHASIZED
O	DOUBLEWIDE EMPHASIZED DOUBLESTRIKE
P	CONDENSED DOUBLEWIDE
Q	CONDENSED DOUBLEWIDE DOUBLESTRIKE
R	CONDENSED DOUBLESTRIKE
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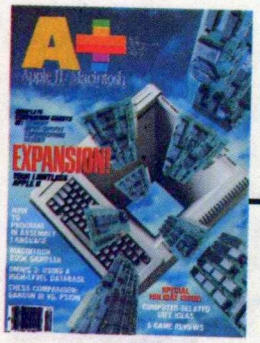

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Window displays short descriptions of any object that you select from either the sky or the planet map. *(List Price: $75)*
Requires: Macintosh
Elton Software
P.O. Box 649
Lafayette, CO 80026
(303) 665-3444
CIRCLE READER SERVICE NO. **515**

MAC

ART A LA MAC

Springboard Software has released Volumes 1 and 2 of Art a la Mac; each volume contains more than 600 pieces of clip art for use with Macintosh computers. Volume 1—People and Places features people in a variety of amusing situations. Volume 2—Variety Pack is a combination of music, plants, vehicles, astrology, outer space, monsters, religious symbols, holidays, and objects found at home and at work. It also contains creative letters and borders. *(List Price: $39.95 each)*
Requires: Macintosh
Springboard Software.
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(612) 944-3912
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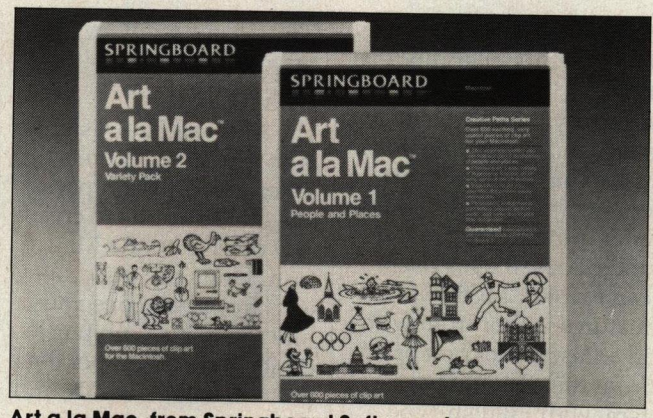

Art a la Mac, from Springboard Software, Inc.

II SERIES

FASTFIND

Fastfind is a high-speed utility that searches word-processor, spreadsheet, database, DIF, sequential, random, and EXEC text files. It can search 100 sector files in 1.3 seconds, load them in 6.1 seconds, and boot them in 10 seconds. The utility also features single or multiple search keys; AND, OR, and NOT logical operators; a variable wild card; single-key press mnemonic commands; and the ability to print reports. *(List Price: $49.95)*
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CIRCLE READER SERVICE NO. **517**

EDD Version 4 is the most powerful copy program available for backing up "uncopyable" or "copy-protected" disks. ■ In addition to backing up disks, **EDD 4** also features a hi-resolution graphic DISK SCAN option to help you locate information on a disk, a CERTIFY DISK option for certifying blank disks, and since it's very important that your disk drives are running properly (especially when copying disks), we have also included an EXAMINE DISK DRIVE option. ■ Even though **EDD 4** has been preset to copy the broadest range of copy-protections possible, **EDD 4** can be "modified" to back up almost any disk that runs on your Apple! ■ For the dedicated user, in addition to **EDD 4,** we are offering an **EDD 4 PLUS** version that includes a specially designed hardware card which allows **EDD** to copy EVERY bit of information from each track accurately! You can bet that if **EDD 4 PLUS** can't copy it, nothing will! ■ **EDD 4** runs on an Apple II, II Plus (including most compatibles, IIe, IIc, and III (using emulation mode), and is priced at **$79.95.** ■ **EDD 4 PLUS** runs on Apple II, II Plus (including most compatibles), and IIe, and is priced at **$129.95** (duodisk/unidisk owners must add $15 for a special cable adapter). Ask for **EDD** at your local dealer, or to order direct, include $3 ($6 foreign) shipping/handling for **EDD 4,** or include $5 ($8 foreign) for **EDD 4 PLUS.** ■ Mastercard and Visa accepted. All orders must be prepaid. ■ If you have an earlier version of **EDD,** you can update to **EDD 4** or **EDD 4 PLUS** at a reduced price. Send your **EDD** disk to us, and deduct $50 from your order.

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Pipeline

MAC

PICTUREBASE

PictureBase is an art-management system for organizing Macintosh clip art and MacPaint or MacDraw documents into an easy-to-use library of pictures. Once you have entered the pictures into the library, you can retrieve them either by browsing through the library or by using PictureBase's Search feature to search automatically for a particular picture by title or description. The system comprises both a stand-alone program and a desk accessory. *(List Price: $48)*

PictureBase lets users create a library of pictures for the Macintosh.

Requires: Macintosh
Symmetry Corporation
3900 East Camelback Road
Suite 103-S
Phoenix, AZ 85018
(602) 224-5944

CIRCLE READER SERVICE NO. **527**

II SERIES

*MONITOR

A system monitor for users of Apple Pascal, *MONITOR provides memory-resident, "pop-up" utilities for Apple II computers. The software includes print-screen and windowing features and has a floating-point calculator. Its disk-filer functions include a disk-directory list and file load, save, and purge functions. It also has memory and disk-editing functions and a built-in miniassembler and disassembler. Users can invoke *MONITOR's features, either from within a Pascal program or from the operating system, with English-type commands. *(List Price: $49)*

Requires: Apple II Plus, IIe, or IIc; Apple Pascal 1.1 or 1.2
dogStar Software
P.O. Box 302
Bloomington, IN 47402
(812) 333-5616

CIRCLE READER SERVICE NO. **526**

II SERIES

PROTEUS—THE IDEA PROCESSOR

PROTEUS—The Idea Processor is a menu-driven program that teaches writers of all ages and abilities to generate and develop ideas and information. The program offers five "prewriting" strategies, each with clear, readily available help screens. It also provides automatic storage of information, can retrieve data, and can print out information from any point in the program. The program comes with a clear, nontechnical manual, and ten-disk laboratory packs are also available with the purchase of each program. *(List Price: $79.95; lab pack, $250)*

Requires: Apple IIe
Research Design Associates, Inc.
P.O. Box 848
Stony Brook, NY 11790
(516) 928-5700

CIRCLE READER SERVICE NO. **563**

MAC

MINICAD 3D-DESIGNER

The Minicad 3D-Designer is an interactive, computer-aided-design package that lets users to create 3-D objects on the Macintosh. Users can build objects from polygons and line segments with ten digits of precision per data point in height, width, and depth. Users can also rotate objects, enlarge or shrink them, and display them from almost any viewpoint, with or without perspective. Objects can appear as wire frame, white solid, patterned solid, or shaded from an imaginary light source. They can also be shaded with standard Macintosh patterns or with the Minicad 3D-Designer's internal gray-scale generator, which produces digitizer-like drawings. After users have completed their drawings, they can use the package's auto-dimensioner to produce drafting-style drawings of top, front, and side views. *(List Price: $395)*

Requires: Macintosh, 512K RAM
Diehl Graphsoft, Inc.
3246-K Normandy Woods Drive
Ellicott City, MD 21043
(301) 461-9488

CIRCLE READER SERVICE NO. **559**

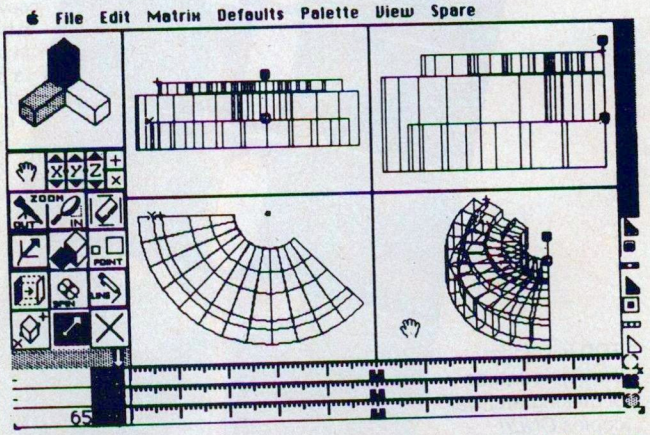
II SERIES

BILL-OF-MATERIALS SOFTWARE

Designed for small manufacturing businesses, Bill-of-Materials is an inventory system that works with GOCI accounting modules. The program provides Material Requirement Planning (MRP) reports. Material cost controls include labor; component, subcomponent, or assembly; and quantity on hand. The software can handle 32,000 inventory items and post items automatically to all appropriate ledger accounts. *(List Price: $795)*

Requires: Apple II Plus or IIe, 64K RAM, DOS 3.3, 10-megabyte hard-disk drive
Focus Software Corporation
9524 Briar Road
Bloomington, MN 55437
(800) 328-6795, ext. 298
in MN (612) 835-7481

CIRCLE READER SERVICE NO. **529**



The MiniCad 3D-Designer is an interactive, computer-aided-design package.

BOOKS

GUIDE TO VCR REPAIR

Chilton's Guide to VCR Repair and Maintenance, by Gene B. Williams and Tommy Kay, is intended to enable you to understand the workings of both VHS and Beta VCRs and to learn to repair and maintain them easily. The manual covers commonly malfunctioning VCR components, including connectors and cables, heads, belts, power supply, and tapes. It contains comprehensive service procedures that show you how to prevent problems and complete step-by-step diagnostic and repair instructions illustrated with clear photographs and line drawings. *(List Price: $12.50)*

Chilton's Guide to VCR Repair and Maintenance

Chilton Book Company
One Chilton Way
Radnor, PA 19089
(800) 345-1214
in PA (215) 964-4000

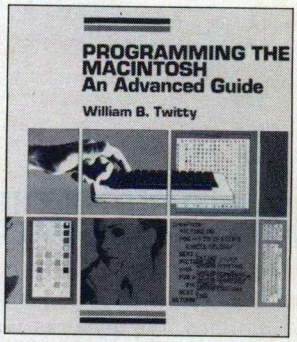
CIRCLE READER SERVICE NO. **521**

MAC

PROGRAMMING THE MACINTOSH

Written for experienced programmers, *Programming the Macintosh: An Advanced Guide*, by Bill Twitty, gives readers an in-depth understanding of the inner workings of the Macintosh. The author shows users how to use Macintosh system software; offers an introduction to the 68000 microprocessor; and explains how to program in various languages.

In addition, he discusses each of the Macintosh compilers and explains how to use the system routines that control menus and windows.



Programming the Macintosh

The 320-page book also includes sample programs in BASIC, Pascal, and assembler. *(List Price: $19.95)*

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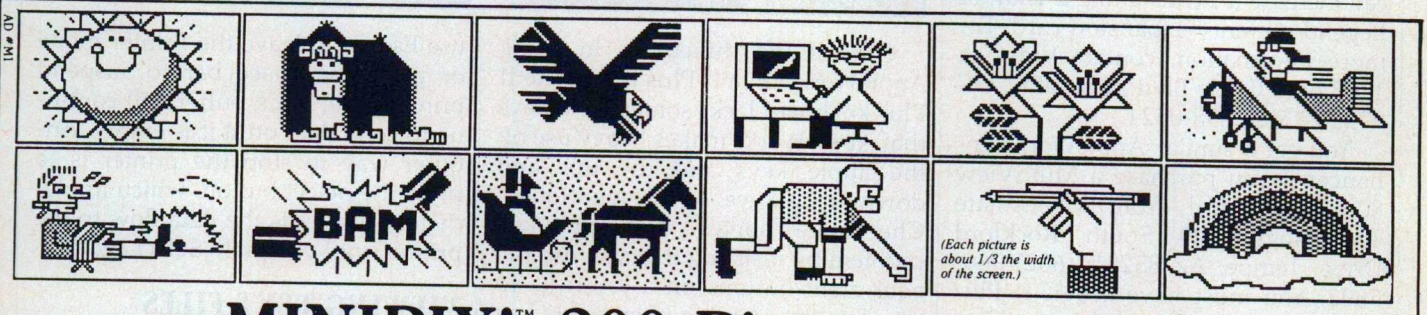

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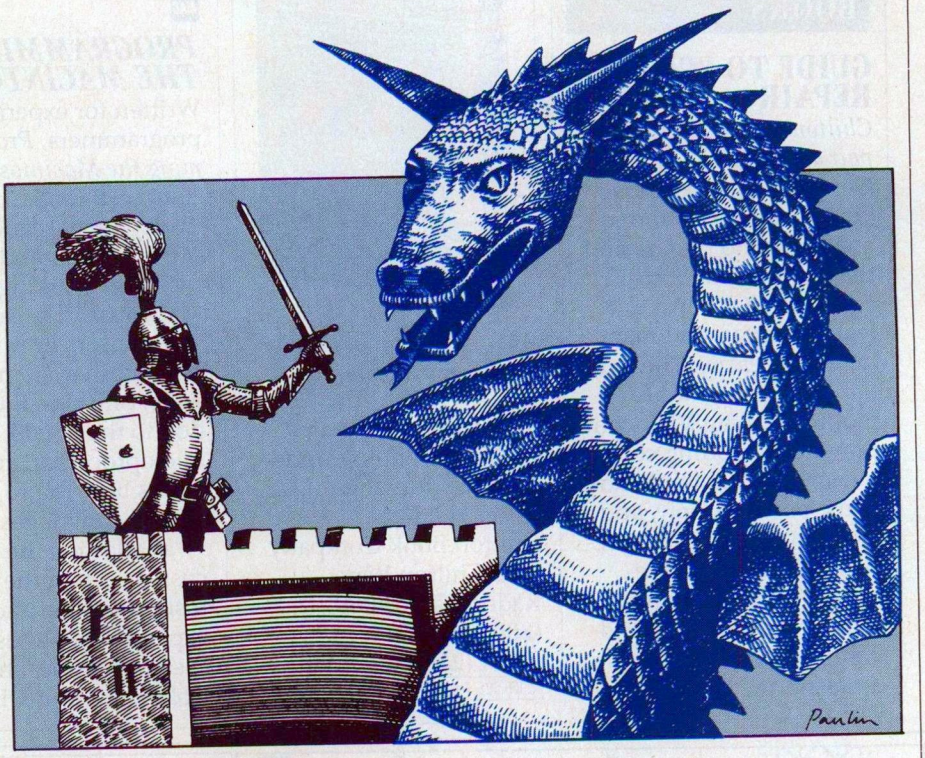
Rescue Squad

BY GARY B. LITTLE



DOUG PAULIN

APPLEWORKS ON THE APPLE II PLUS COMPUTER

Q. *How can I get AppleWorks to work on my Apple II Plus?*

A. Standard AppleWorks works only with a IIe or IIc. Three companies of which I am aware, however, have now developed modifications or "patches" for AppleWorks to make it work properly with the old Apple II Plus.

The first product is Videx's AppleWorks Modify Plus. To use it, you must have a Videx Videoterm or UltraTerm 80-column display card and at least 64K of RAM. With this configuration, your document desktop will be only 10K in size, but you can increase it by installing a Titan or Legend memory-expansion card. For more information, contact Videx at 1105 N.E. Circle Blvd., Corvallis, OR 97330; (503) 758-0521.

You get a similar AppleWorks enhancer if you purchase a MultiView 80-column card from Checkmate Technology, 509 South Rockford Drive, Tempe, AZ 85281; (602) 966-5802. You must have a 64K II Plus and a joystick with two buttons to use this program—the joystick buttons simulate the IIe's open- and closed-apple keys. The program does not work with memory-expansion cards, so the AppleWorks desktop is only 10K, but Checkmate is working on a new version that will work with a "IIe emulator" card that should be available in April. This card plugs into slot 0 of a II Plus and contains either 256K or 512K of memory that you can use to enlarge the AppleWorks desktop.

The third product is Plus-Works from Norwich Data Services, P.O. Box 356, East Norwich, NY 11732; (516) 922-9584. It works with most 80-column cards available for the II Plus. It also comes in an XM version that takes advantage of the extra memory on a Legend or Titan memory-expansion card.

One of the difficulties in using AppleWorks on a II Plus is that the II Plus keyboard lacks some of the keys that AppleWorks makes heavy use of: the apple keys and the up- and down-arrow keys. As I've mentioned, Checkmate solves the apple-key problem by insisting that you use the equivalent buttons on a joystick. To simulate the pressing of an apple key with AppleWorks Modify Plus, you enter a Control-A. You enter the missing arrow keys by selecting their control-character equivalents, Control-K and Control-J. With Modify Plus, if you have a Shift-key modification installed, you can also enter the up- and down-arrow keys by pressing the Shift key when you enter the left- and right-arrow keys.

STOPPING THE IMAGEWRITER

Q. *When I use AppleWorks, the space-bar printer hold and Escape printer halt don't work, at least not immediately, on my ImageWriter printer. Is this a goof in the program or a flaw in the printer?*

A. No. The reason the ImageWriter continues to print is due to a built-in two-kilobyte input buffer. Even if you use Escape to leave the Printer mode or press the space bar to suspend printing, the input buffer will continue to send data until it is empty. Another way to stop the printer is to press the Select button, which immediately suspends the data flow to the printer until you press Select again.

VIEWING TEXT FILES

Q. *Is there a simple way to display the contents of a DOS 3.3 or ProDOS text file on the screen?*

A. Unlike the operating systems of some other computers, DOS has no single command for displaying what's in a text file on an Apple II disk. The CP/M and MS-DOS operating systems, for example, have a Type command that you can use for this purpose.

Perhaps the easiest way to view a text file is to run a program such as the one in figure 1 on the following page. It first opens any text file you specify and then does successive calls to an assembly-language program located at 768 ($300) to read each line in the file. As the program reads each line, it displays it with a PRINT A$ command. When an End of File error

```
100 D$ =  CHR$ (4): TEXT : HOME
110  FOR I = 1 TO 31: READ X: POKE 767 + I,X: NEXT
120  PRINT "TEXTFILE READER"
130  PRINT "COPR. 1986 GARY LITTLE"
140  PRINT : INPUT "ENTER NAME OF TEXTFILE: ";F$: HOME
150  ONERR  GOTO 200
160  PRINT D$;"OPEN";F$
170  PRINT D$;"READ";F$
180  CALL 768,A$:A$ =  MID$ (A$,1): REM Instead of INPUT
190  PRINT A$: GOTO 180
200  PRINT D$;"CLOSE"
210  END
1000  DATA 32,190,222,32,227,223,169,128,133,51,32,106,
           253,160,0,138,145,131,169,128,133,51,32,106,
           2,200,145,131,76,57,213
```

Figure 1: You can use this Applesoft program to display the contents of any text file.

occurs, the file is closed and the program ends.

Notice that you can't use the standard Applesoft Input command to read a line of text from the file. If you do, any characters following a comma (and also a colon) will be ignored because the comma serves as a field delimiter to separate the responses to an Input statement that has more than one argument. In general text files, however, the comma is just like any other character and doesn't require special interpretation.

The subroutine at 768 ensures that the program will read the entire line and assign it to the string variable A$, despite the presence of commas. If you are interested in assembly-language programming, see the details in the comments to the program listing in figure 2 below.

If you're using ProDOS, you can define and add your own Type command to the standard BASIC.SYSTEM command set, by using the techniques I described in my "Understanding ProDOS" article in the July 1985 issue of *A+* (page 69). You can find specific examples of how to install a Type command in articles by Cecil Fretwell (*Call-A.P.P.L.E.*, May 1984, pages 42–49) and Tom Weishaar (*Softalk*, June 1984, pages 157–165). After you install a Type command, you can display the contents of a text file by using the phrase TYPE pathname.

Depending on how you define the Type command, you may even be able to include parameters that control the format of the output. ✚

```
                        1   ******************************
                        2   * "Input anything" subroutine *
                        3   *  Copr. 1986 Gary B. Little  *
                        4   *                             *
                        5   *  CALL 768,A$:A$=MID$(A$,1)  *
                        6   *                             *
                        7   ******************************
                        8
                        9   PROMPT   EQU   $33          ;Prompt symbol
                        10  VARPNT   EQU   $83          ;Pointer to variable
                        11
                        12  IN       EQU   $200         ;Input buffer
                        13
                        14  GDBUFS   EQU   $D539        ;Clear high bits of string
                        15  CHKCOM   EQU   $DEBE        ;Skip comma
                        16  PTRGET   EQU   $DFE3        ;Find pointer to variable
                        17  GETLN    EQU   $FD6A        ;Monitor's line input
                        18
                        19           ORG   $300
                        20
0300: 20 BE DE          21           JSR   CHKCOM       ;Skip over the comma
0303: 20 E3 DF          22           JSR   PTRGET       ;Get addr of A$
                        23
0306: A9 80             24           LDA   #$80         ;No prompt
0308: 85 33             25           STA   PROMPT
030A: 20 6A FD          26           JSR   GETLN        ;Read line
                        27
030D: A0 00             28           LDY   #0           ;access length byte
030F: 8A                29           TXA                ;X = length
0310: 91 83             30           STA   (VARPNT),Y   ;Save length
                        31
0312: A9 00             32           LDA   #<IN         ;Save addr (low)
0314: C8                33           INY
0315: 91 83             34           STA   (VARPNT),Y
0317: A9 02             35           LDA   #>IN         ;Save addr (high)
0319: C8                36           INY
031A: 91 83             37           STA   (VARPNT),Y
                        38
031C: 4C 39 D5          39           JMP   GDBUFS       ;Clear high bits
```

Figure 2: The source code for the subroutine that reads a complete line of text at a time

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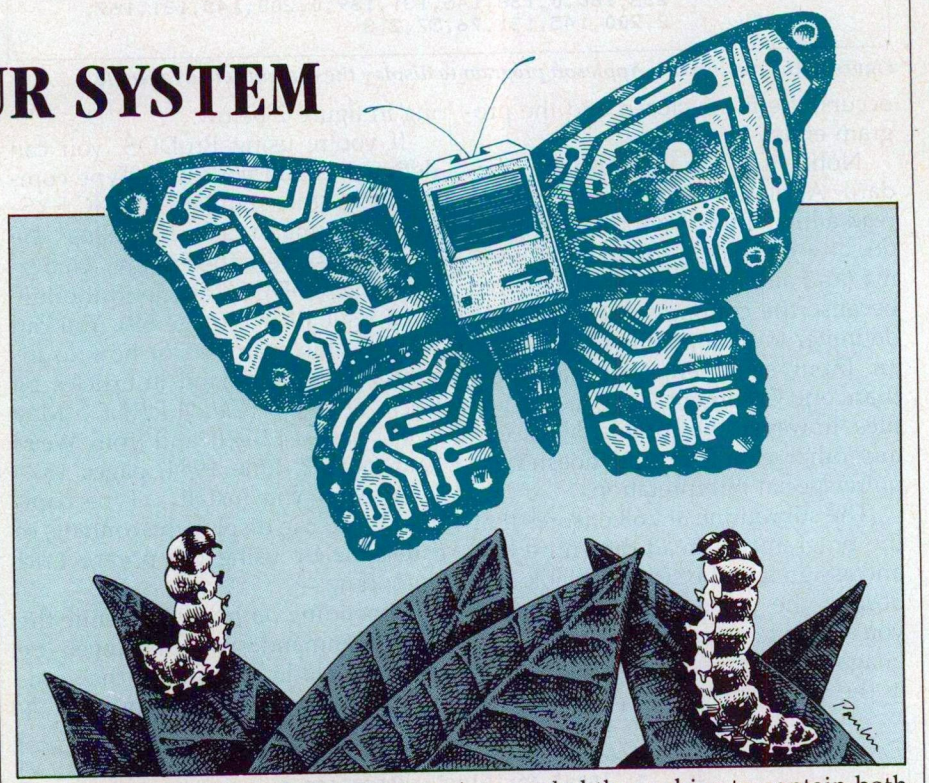
BY STEVE ROSENTHAL

BRINGING YOUR SYSTEM UP TO DATE

Weighing the pros and cons of computer upgrades



Is upgrading last year's computer as necessary as refilling your calendar or as optional as wearing this year's fashions? That is a key question for all Apple owners, except the most wealthy or compulsive, as the pace of evolution quickens again for both the Macintosh and the Apple II.

Of course, even after Apple announces upgrades, machines that were previously working continue to do so. If you have a Mac or an Apple II and it serves your purposes as it is, you may want to stick with what you have. Upgrading costs time, money, and effort.

On the other hand, if you use your computer for serious business or heavy hacking, you may find bringing your system up to date worthwhile.

In some cases, you really don't have a choice. If your application requires regular additions of software and software vendors assume you'll have the new hardware, you'll have to make the investment.

On the other hand, if the vital components of your software library can't work with an upgrade and you're not ready to switch programs, you'll have to sit tight. Although the ideal for any upgrade is full backward compatibility with existing products, that goal may be only partially possible in practice.

Many programs for the Apple IIe, for example, are now created on the assumption that you've upgraded your internal chips (the 6502 CPU chip that does the processing and the ROM chips that carry the permanent built-in memory) to match those that Apple introduced with the IIc. Programs that use a mouse cannot work with the older configuration.

A lot of Apple II hardware, by contrast, doesn't work with the Apple IIc.

If I look at my software collection, I find that most of the more-interesting products won't run on an unaltered II.

The serial ports as virtual slots may be nice in theory, but for many products you just have to have the older design.

On the Macintosh, the recently announced ROM-chip upgrades may pose a similar quandary. Apple has upgraded these chips to contain both improvements and some code that the current Mac gets from on-disk system files.

For a while, most new programs will probably work with both the new and the old ROM chips, but the new chips contain the features and fixes that developers will want to use. Software that uses those features is apparently already in the pipeline.

Unfortunately, backward compatibility with the new chips won't be complete. Some programs that worked fine with the old chips reportedly don't work with the new ROMs. An upgraded Mac may be just what you need to run new software—and just what you can't use to run some of your current packages.

If the Mac were any other machine, you could at least partially solve the problem by using installation procedures or customizing preboots. In the Macintosh market, that approach probably wouldn't work, however. Mac users have become ac-

DOUG PAULIN

customed to having software run right out of the box, and many even bought a Mac because it promised to free them from the messy details of such low-level procedures. Consequently, I predict, you will soon see an increasing amount of software that works only on the upgraded Macintosh ROMs and some furious rewriting of existing applications.

Incidentally, both Apple-II-series and Mac users may have a further and more extreme upgrade to face later in the year if Apple goes ahead with giving both the II and the Mac more powerful processing chips. New CPU chips will probably mean new ROMs and certainly new software. It's not clear to me yet if we should consider a 65816-based Apple II or a 68020-based Mac new machines or upgrades of the current models. My inclination is to look at the current crop of upgrades separately.

Chip compatibility may not be our worst dilemma, however. For most of us, the place backward compatibility problems may hit home first is in the disk drive.

On the II, Apple's attempts to upgrade from the original Disk II to the UniDisk 3.5 has yet to gather much momentum, so you probably don't have to do anything about upgrading immediately if you're a school or home user. Although many developers may feel cramped by the original 143K bytes of storage of the Disk II, the budgeting cycles of school and home users precludes any quick, massive change.

Chip compatibility may not be our worst dilemma, however; backward compatibility problems may hit home first in the disk drive.

Apple, for example, has adopted a policy of providing both 3.5-inch and 5¼-inch disks in its software packages, figuring that many buyers may switch sometime during the life of the software. Other firms offer you a choice of either format.

A revival of business uses of the Apple II, however, driven possibly by new chips and the new software they would make possible, could change all that. New business software for the II that depends on the 800K disks might provide such a mass of users that even home-software companies would make the switch to the new disk drive. Businesses with existing underused IIs would probably purchase the upgrade, on the grounds that sometimes you have to spend a few hundred dollars to keep several thousand dollars of machinery in use.

On the Macintosh, this dynamic may already be in the works. Even though the original Macintosh disks, at 400K each, were capacious compared to the 143K of the II, the demands of Mac software have made the 400K seem anemic. As everyone with a Mac knows, the disks have seemed too small and too slow right from the start.

The new double-sided disks will more than double the available space in most applications, since most Macintosh programs use a good chunk of the original space for a copy of the Mac system files. Because that area

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needn't double when you go to two sides, the remaining space for programs expands by more than its original area.

More than half of the dozen software developers that I spoke with shortly before the official announcement of the double-sided disk for the Mac admitted that they were planning or considering production of at least one program that would be available primarily or exclusively on double-sided disks. "Of course we want to support people who only have single-sided drives," one told me, "but what we can do with that extra room will make it worth your while to upgrade." To encourage people to upgrade, Apple has priced the Mac disk upgrade at a low $299.

Developers are not as willing, as yet, to consider hard disks a necessity, but my guess is that that will be the case much sooner than some might think. On the IBM PC, a hard disk is becoming the standard for business use, a trend that may persist even in the face of widespread networking. The new SCSI interface for the Macintosh Plus provides the higher rate of data interchange that the Mac needs to support its high-quality user interface.

Although older hard-disk drives for the Macintosh do not require the SCSI interface, business-computer users who need more storage and faster I/O than the older drives provide—as well as integral tape backup—may find it worthwhile to upgrade their Macintosh logic board to include SCSI.

Apple Support

Apple, of course, is expected to say that it will continue to support the complete Macintosh line, the IIe, and the IIc (older machines are somewhat covered by the Apple policy of continuing to supply parts and repairs for machines up to seven years from the last manufacturing date of the machine). The company will want you to upgrade, but the official line will probably be that it's your personal choice.

Given that supposition about the official position, it might still be instructive to look at some other upgrades Apple and other firms have made, to see what the result has been in practice.

The original Apple II sported a 40-column display and a keyboard that provided only uppercase letters. A fully loaded system was 64K, including both permanent ROM memory and read/write RAM.

If I look at my software collection, though, I find that most of the more-interesting products won't run on an unaltered II. Sure, the software I had then still runs, but that's not what I use now. Even software from Apple—AppleWorks in particular—won't run on an unadorned Apple II.

Similarly, on the Mac, most of my early software can run on a 128K machine, but not so for at least half of what I actually use to get work done. In fact, although I don't have any programs yet that require more than 512K, a lot of them work better on a Mac with at least a megabyte.

The disk-drive question may be even more instructive. If you're a veteran of either the CP/M or IBM PC world, you may remember that when double-sided drives came out for those machines, both vendors and software developers also claimed they would continue to support both configurations. Within six months,

(Continued on page 163)

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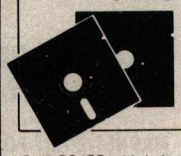

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If you accept that upgrading may be desirable or inescapable, that still leaves unanswered the questions about when and where, who and what. I'll leave the who and where for another time, but let's take a brief look at when and what.

There's no question that being among the pioneers gets to be a pretty expensive proposition. Computer equipment generally is introduced at a premium price, and then the cost drops sharply with competition and experience, until the product vanishes into obsolescence.

The Cost of Early Buying

If you want to figure out the economic costs of being an early buyer, try comparing the rental cost you'd be willing to pay to use any of the improvements with the money you think you'd save by waiting. If you want an accurate test, be sure to include your best estimates of any productivity gains, on the one hand, and the disruption and retraining time along with the direct upgrade cost on the other.

When you consider the direct costs, you'll find that it often pays to wait. If your needs are not pressing, you might decide to sit out the first round, especially if you're on a limited budget.

On the other hand, I have noticed that a large proportion of the people I meet who complain about how much they paid to be an early buyer of a computer or peripheral have used that leverage to their advantage. Upgrading early is always a gamble—but at least the odds of success are substantially better than those of the California state lottery. In the meantime, furthermore, you will at least have a ticket to better use of your equipment. +

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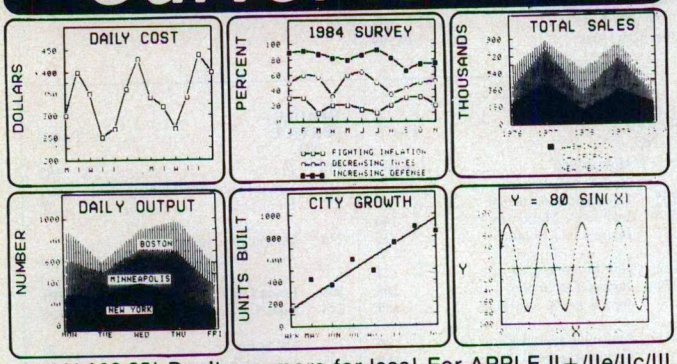

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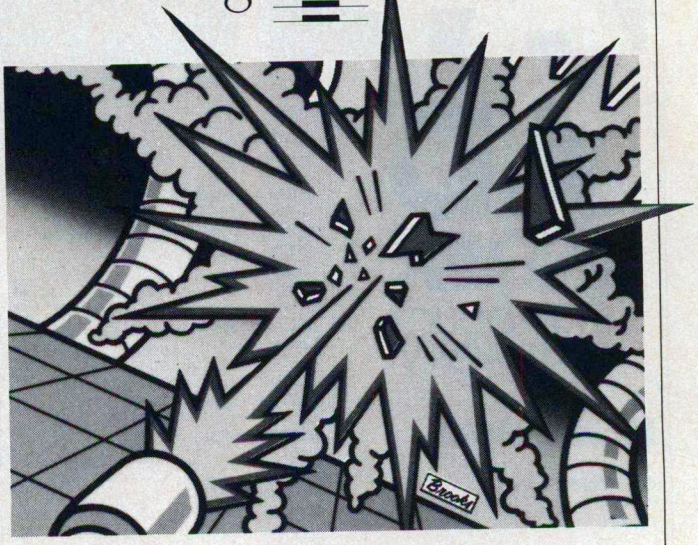

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	(1.) Own	(2.) Plan to Buy
Apple II	A	H
Apple II+	B	I
Apple //e	C	J
Apple IIc	D	K
Macintosh	E	L
Other (specify)	F	M
None	G	N

Please indicate which of the following types of software you currently own and/or plan to buy in the next 6 months. Then, for each type you plan to buy, please indicate when this purchase will most likely be made.

	(3.) Plan to Buy	(4.) 1-3 Months	(5.) 4-6 Months
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Educational Software	Q	V	1
Entertainment Software	R	W	2
Programming Software	S	X	3

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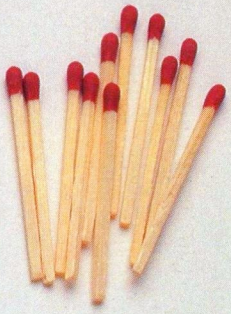

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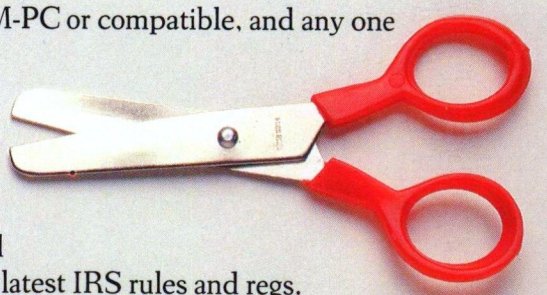

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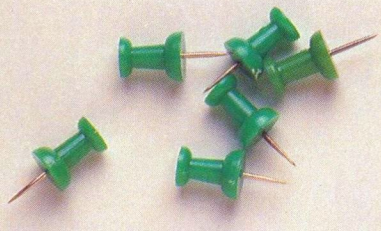

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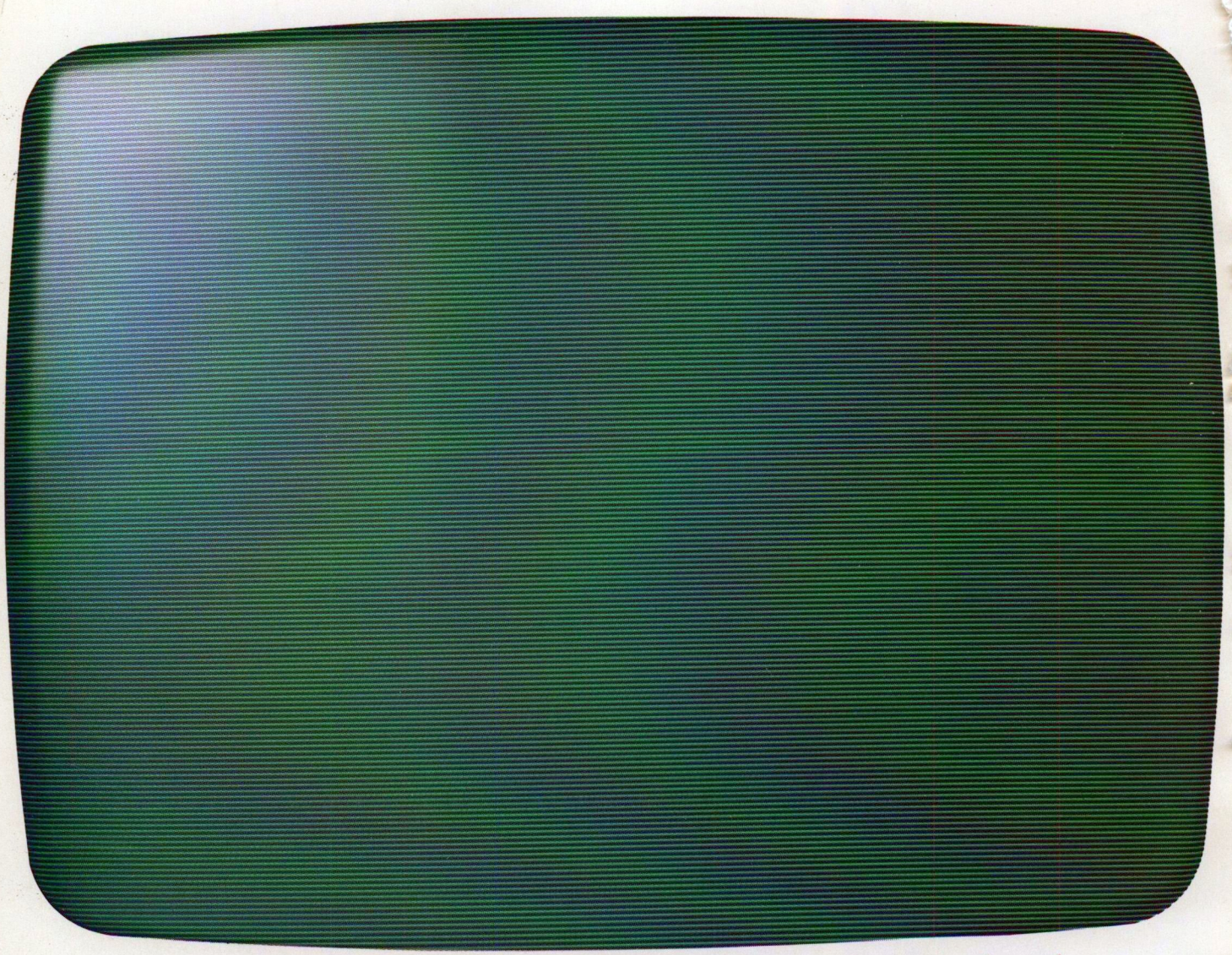

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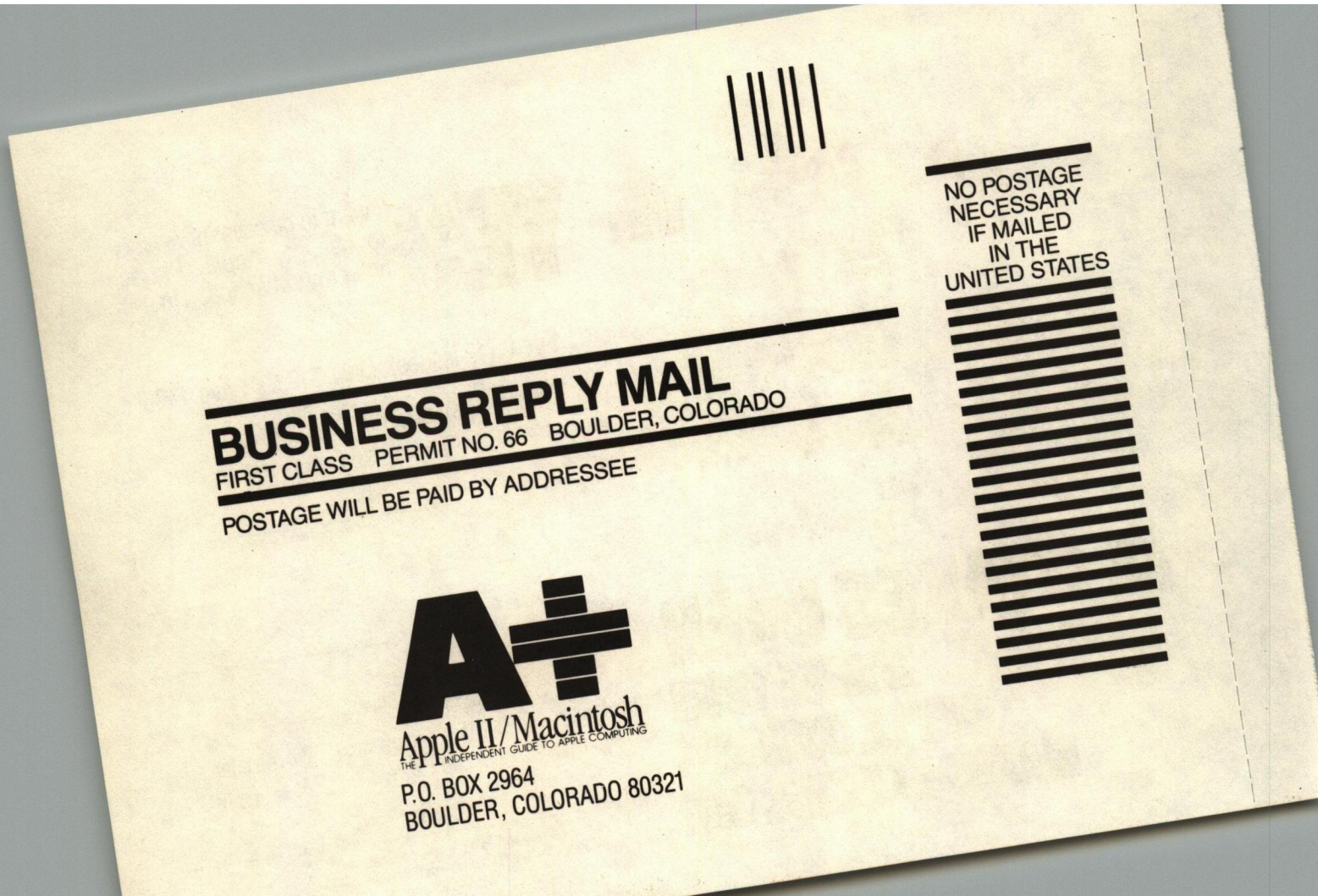
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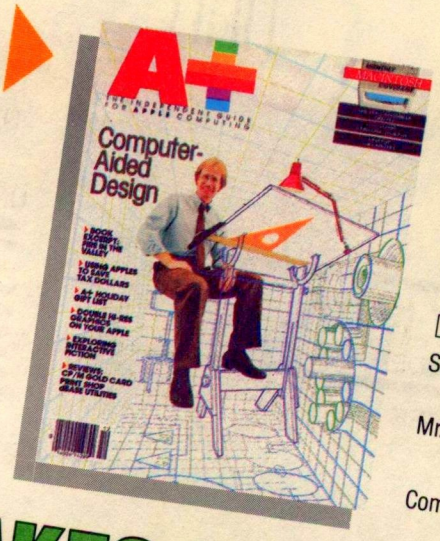

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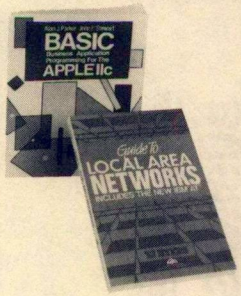

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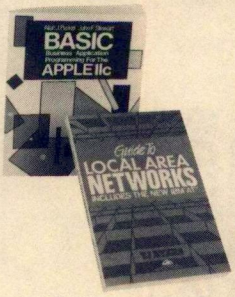

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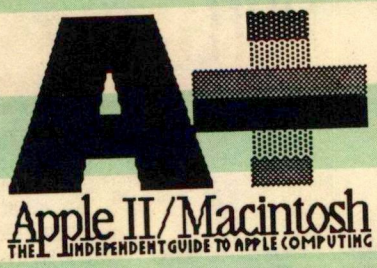

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